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ABSTRACT

Recycling is a very important aspect of conserving the environment for future generations. This guide addresses the topic of litter prevention for the Alaskan environment and contains 42 activities. Activity topics covered include Natural Cycles, Human Interruption of Natural Cycles, Reduce, Reuse, Recycle and Recycled Classroom. Grade level, subject area, concept, learning objectives, time frame, materials, and procedures are stated for each activity. Some activities contain suggestions for options, follow up activities, vocabulary, and regional adaptations. The worksheet materials are specifically geared for the Alaskan environment but may also be incorporated into a lesson plan on Alaska. The activities can be integrated into most science, language arts, and social studies curriculums. There are 12 worksheets which cover topics such as forest, tundra, aluminum recycling, newspaper recycling, and composting. Two worksheets are designed to be used after an investigative field trip to Alaska's forest and tundra areas. Seven worksheets are devoted to language arts skill development using word finds and crossword puzzles. The teacher's guide covers the topic of litter prevention. The materials are specifically geared for the Alaskan environment but may also be incorporated into a lesson plan on Alaska. Activities can be integrated into most science, language arts and social studies curriculums. An overview of the topic with references to activities in the Activities Handbook, tips for making and using puppets, and answer keys are provided. The curriculum is designed around four broad topics that include Awareness of Natural Cycles, Reduce, Reuse, and Recycle. A fifth topic, the Recycled Classroom, provides ideas for reusing trash in the classroom. Goals and objectives are stated for each activity and particular emphasis is placed on incorporating these activities into history and literature lessons. (SJR)

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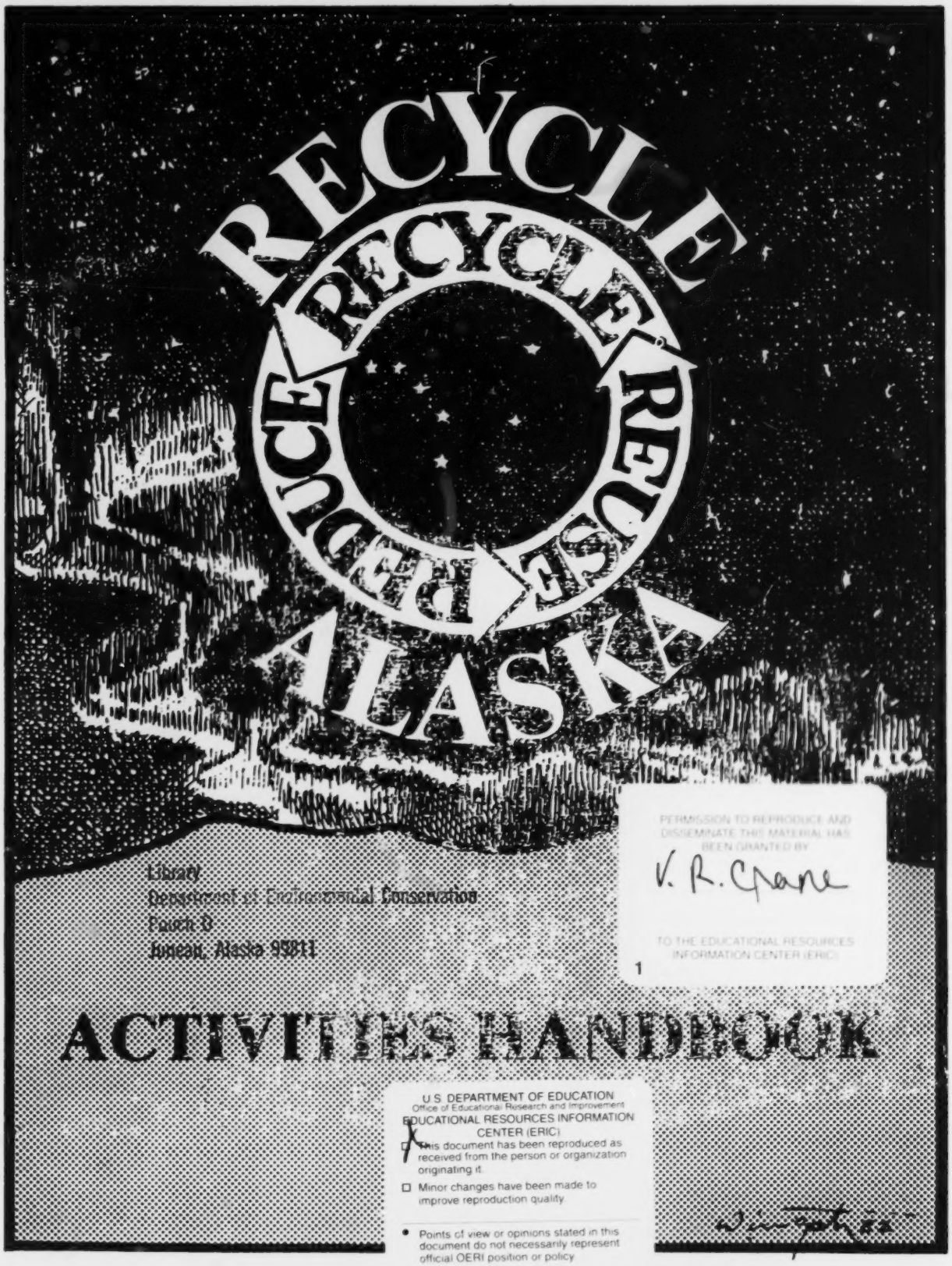

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ACTIVITIES HANDBOOK

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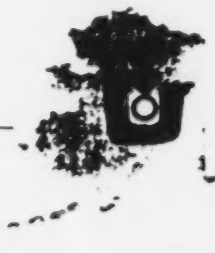

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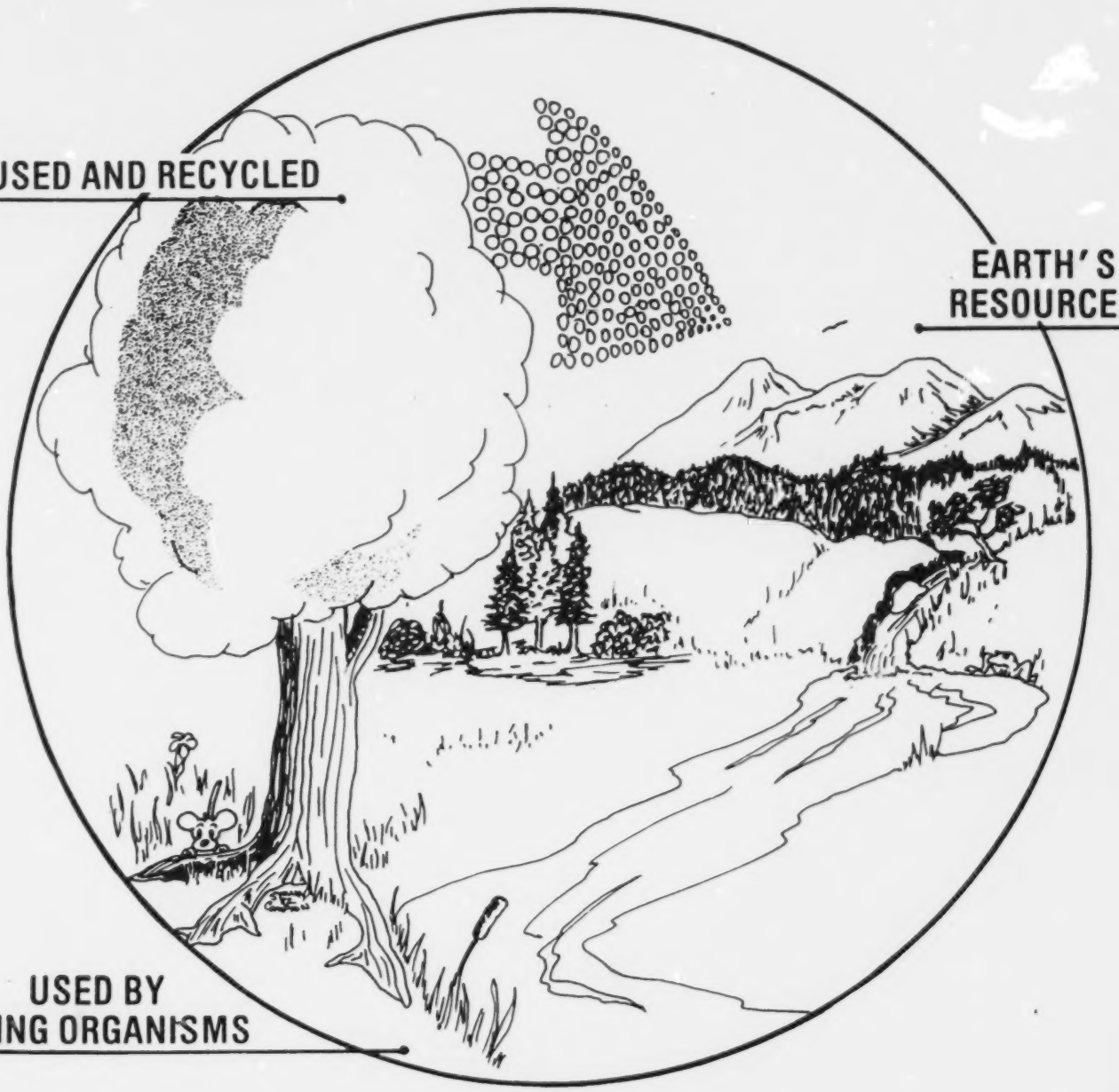
NATURAL CYCLES



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FOREST FIELD TRIP

Grade Level(s)—3-6

Subject Area—Science

Concept—Nature recycles

Learning Objective(s)—Students will be able to describe the roles of plants and animals in the decomposition of organic matter

Time Frame—Before the ground freezes

Materials: handout sheet (page 1 & 2 of the student worksheets)
collection bags
digging tools
thermometer

Procedure: Take a field trip to a woods with old trees, stumps, leaves, old logs, stones, and other places where plants and animals are at work recycling nature 's waste. Divide the class into teams of four students each and give each team a set of the listed materials. Instruct each team to fill out their instruction sheet in a prechosen area as they investigate the decomposers of that area. (You might mark off borders with light string.) Also instruct the teams to be prepared to PUT BACK most animals that they see, and to collect only one of any kind of animal.

Follow-up Activity: 1) Use resource center study aids to find out about the life and ways of the various plants and animals.

2) Make drawings of the various plants and animals you have found.

3) Discuss the need for people to learn how to recycle their many waste products. At a future date, you may wish to have a study unit on how people handle their "solid wastes." Are there decomposers for people 's waste?

4) Write a fiction story, poem, news report, or scientific report about the role of decomposers and how they clean up the forest.

Use the materials and information collected in this activity to conduct the "Forest Community" exercise.

THE FOREST COMMUNITY

Grade Level—K-6 (with adaptations)

Subject Area(s)—Science, Art, Language Arts

Concept—The forest community is interdependent

Learning Objective(s)—Students will be able to describe the food web

Materials: Blackboard/butcher paper
colored chalk/crayons

Procedure: Have students draw a mural on paper (or blackboard) depicting a forest community including animals and plants expected to share this community. Begin with the plants and fill in the animals. Then start a discussion. Topics might include: How could we make a food web of this picture? (connect animals to what they eat) Why do we call it a forest "community"? (groups of plants and animals living together in the same environment) What is interdependence? (depending on each other)

Illustrate a food cycle on the blackboard and discuss it. Possible discussion questions might be: Why do animals need plants? (food and shelter) Who eats plants? (plant-eating insects and animals; herbivores) Who eats plant-eating animals? (preying insects and carnivores) Where do plants get food? (from the soil) What makes food for plants? (death and decay) What if there were no decay? (plants would lose their food source)

Options: It may be desirable for the younger grades to actually form a food web at the start, taking the roles of the various animals and plants, connecting themselves to others relied upon. It might also be helpful for younger children to take time becoming aware of what plants and animals make up a forest community.

Vocabulary: interdependence, omnivore, herbivore, decay, food cycle, habitat

Regional Adaptation: See exercise for The Tundra Community

TUNDRA OR ALPINE FIELD TRIP

Grade Level(s)—3-6

Subject Area—Science

Concept—Nature recycles

Learning Objective(s)—Students will be able to describe the roles of plants and animals in the decomposition of organic matter

Time Frame—Before the ground freezes

Materials:
handout sheet (page 3 & 4 of the student worksheets)
collection bags
digging tools
thermometer

Procedure: Take a field trip to a relatively undisturbed area of tundra or alpine where plants and animals are at work recycling nature 's waste. Divide the class into teams of four students and give each team a set of the listed materials. Instruct each team to fill out their instruction sheet in a prechosen area as they investigate the decomposers of that area. (You might mark off borders with light string). Also instruct the teams to PUT BACK most plants and animals that they see and to collect only one of any kind of plant or animal.

Use the materials and information collected in this activity to conduct the "Tundra Community" exercise.

THE TUNDRA COMMUNITY

Grade Level—K-6 (with adaptations)

Subject Area(s)—Science, Art, Language Arts

Concept—The forest community is interdependent

Learning Objective(s)—Students will be able to describe the food web

Materials: Blackboard/butcher paper
colored chalk/crayons

Procedure: Have students draw a mural on paper (or blackboard) depicting tundra community including animals and plants expected to share this community. Begin with the plants and fill in the animals. Then start a discussion. Topics might include: How could we make a food web of this picture? (connect animals to what they eat) Why do we call it a tundra "community"? (groups of plants and animals living together in the same environment) What is interdependence? (depending on each other)

Illustrate a food cycle on the blackboard and discuss it. Possible discussion questions might be: Why do animals need plants? (food and shelter) Who eats plants? (plant-eating insects and animals—herbivores) Who eats plant-eating animals? (preying insects and carnivores) Where do plants get food ? (from the soil) What makes food for plants? (death and decay) What if there were no decay ? (plants would lose their food source)

Options: It may be desirable for the younger grades to actually form a food web at the start, taking the roles of the various animals and plants, connecting themselves to others relied upon. It might also be helpful for younger children to take time becoming aware of what plants and animals make up a tundra community.

Vocabulary: interdependence, omnivore, herbivore, decay, food cycle, habitat

Regional Adaptation: It is important to note that in the extreme northern regions the higher order plants are not a significant part of the food chain and that the mosses, ferns, lichens, and fungi provide almost all of the green plant portion of the chain.

NATURAL DECOMPOSITION CYCLES

Grade Level(s)—K-4

Subject Area—Science

Concept—Natural breakdown of organic matter has been going on for billions of years

Learning Objective(s)—The student will be able to state that leaves and other plant materials have always been decomposing to form more soil

Materials: Dead leaves in varying stages of decomposition
3 x 5 cards
string

Procedure: Collect dead leaves in several stages of breakdown. Ask the students if they know what becomes of all the leaves that are on the ground in the fall? Where do they go next summer?

Make the connection that leaves become soil by letting the children see and feel the layers of leaf and soil that you collected.

Make a large art project showing the cycle of leaves. The illustration should show how a tree 's leaves fall, decay into the soil, nourish the tree by making the soil richer, and thus help the tree to grow and produce more leaves.

Another way to illustrate would be to print the following words on 3 x 5 cards: soil, buds, roots, green leaves, trunk, dead leaves, branch. Distribute the seven cards to seven children at random. After each child has shown its card to the class, give a long piece of string to the child holding the card marked "soil". Ask the children to arrange themselves in the proper order of growth. As each determines its corresponding position, he or she should take hold of the string. They should end up in a circle.

Regional Adaptation: Leaves will not be available in the far northern areas of the state but the cycle of decomposition is more critical here than perhaps anywhere else. All of the soil is derived from the decomposition of past plant material. The entire activity can be conducted with any existing vegetation.

WHAT IS BIODEGRADABLE?

Grade Level(s)—K-6

Subject Area—Science

Concept—Some materials decompose when buried; others do not

Learning Objective(s)—1. Students will be able to state the kinds of material that nature recycles
2. Students will be able to state the kinds of material nature does not recycle

Materials: Five pieces of glass, aluminum, paper, steel, apple or other fruit, lettuce, or other vegetable

Materials & Procedure: Display a piece of glass, aluminum, paper, apple, lettuce and steel. Ask the class to predict which of these substances are capable of rotting or decomposing; i.e., which are biodegradable? Conduct the following experiment to determine whether their predictions were correct:

Dig enough soil from a garden or vacant lot to fill five containers. (One-pound cottage cheese containers would be suitable.) Collect five pieces of each of the substances originally displayed and bury one piece of each substance in each container. Number the container from 1 to 5. Examine one of the containers each week for the next five weeks. Each time a container 's contents are examined, have the class keep observations on the condition of each of the five substances. After the last container has been opened, check the original prediction and draw conclusions about which substances are biodegradable.

Note: Teacher should try this prior to using it in the classroom.

Vocabulary: biodegradable

Regional Adaptation: This activity can be changed slightly to demonstrate a major problem with litter in Alaska. It is the extremely slow decomposition time for biodegradable as well as non-biodegradable materials.

Before the ground becomes too frozen in the fall, bury identical materials both outside and in containers inside where it is warmer. Keep the inside containers wet and near a heat source or in the warmest part of the room. Leave one of the containers until spring in order to compare it to the same materials buried outside.

Stress that whatever is dropped in Alaska does not decompose quickly and is likely to be an eyesore until it is picked up.

MOLD GARDEN

Grade Level(s)—K-6

Subject Area—Science

Concept—Mold helps to decompse trash

Learning Objective(s)—The students will be able to state that mold is one of the factors that decompose trash

Materials:
container
small pieces of fruit such as apple, orange skin, or bread, or cheese
small amount of moist soil
clear plastic
rubber band

Procedure: As a demonstration place very small pieces of fruit, bread and cheese on top of some moist soil in a container. Cover with the clear plastic and rubberband. Observe the changes.

Ask the children if they know what is growing on the food. Explain to them that these are molds and that they help return things to the soil by feeding on the food.

Follow-up Activities: Report on molds from the encyclopedia or other available sources.

Regional Adaptation: Stress the similarity of molds and their actions on organic materials to lichens and mosses in the northern and high altitude areas of the state. The acids produced break down plant material and even rock into small bits of soil that is then able to support higher plants.

DECOMPOSITION OF TOILET TISSUE

Grade Level(s)—K-6
Subject Area—Science

Concept—Even goods which are biodegradable decompose at various rates

Learning Objective(s)—Students will be able to state that various types of paper decompose at different rates

Materials: Obtain as many brands or varieties of toilet tissue as you can. In addition to the types made by various companies and sold in stores, your collection might include types often found in the washrooms of large commercial buildings. Instead of using toilet tissue, a variety of facial tissue or paper towels could be substituted.

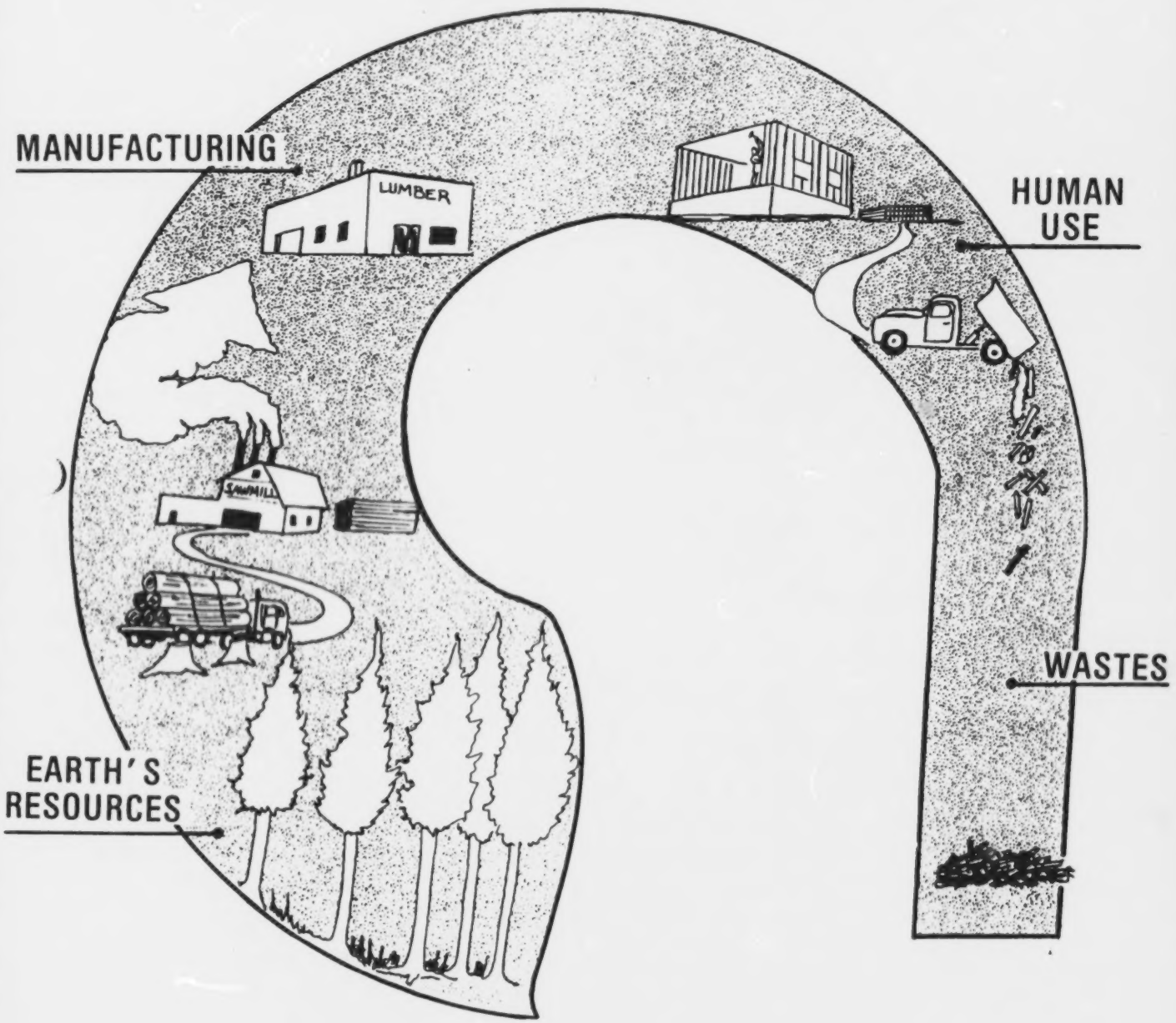
Procedure: Cut or tear two pieces from each type of toilet tissue. Every piece should be approximately the same size. Collect as many wide-mouthed glass jars (of the same size and type) with lids as the number of types of toilet tissue you have. Place a different type of toilet tissue in each jar. Fill each jar half full with water. Tape one piece of tissue to the outside so that you know which type of paper is in the jar.

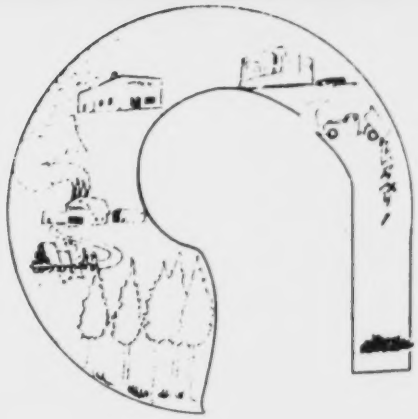
Put the lids on and shake each jar back and forth in exactly the same way twenty times. Compare the paper inside the jar with the sample taped to the outside.

Allow the jars to rest undisturbed for one week, then shake them again in the same manner and make more comparisons. Why was the size of the jar, the size of the paper, the amount of water, and the number of shakes always kept the same? Which brand of toilet tissue had disappeared the most? Which brand had changed the most? Which brand had changed the least? Which brand would you consider to contribute most to pollution? Why? What does the term "biodegradability" mean?

Follow-up Activities & Regional Adaptation: Alaska provides probably the widest range of community sewage disposal systems anywhere in the United States. They range from the newest and most modern to none at all for entire communities. Discuss the possibility of improving the waste disposal system in your community.

HUMAN INTERRUPTION OF NATURAL CYCLES





WHAT DID IT LOOK LIKE THEN

Grade Level—1-6

Subject Area(s)—Science, Language Arts, Social Studies

Concept—The environment is fragile and must be treated gently

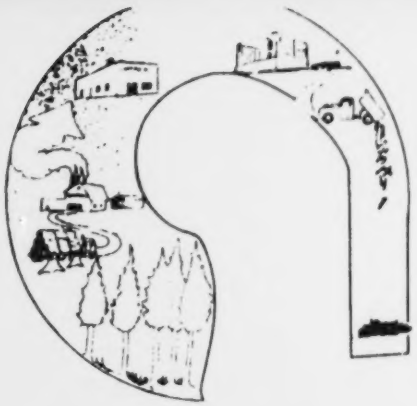
Learning Objective(s)—Students will be able to state one effect humans have had on the community landscape

Materials: No special materials needed

Procedure: Take the students to a high point near the school with a good overview of the townscape (perhaps the school roof may be a suitable site). Ask the students to imagine what the land in front of them looked like 150 years ago. Leading hints will help: Was there a town here? If so, was it a winter camp, summer camp or permanent village? Were there permanent houses? Were there simple houses? Were there more trees (where appropriate)? Were there cars and snowmachines?

The teacher will then lead the imagining through time towards the present, allowing the students to generate ideas on what happened as the area was settled and developed.

Follow-up Questions & Activities: Invite an elder to describe the area when he/she was a child.



THE ORIGIN OF PRODUCTS

Grade Level—K-6

Subject Area—Language Arts, Social Studies

Concept—The natural environment provides resources which we depend upon

Learning Objective—Students will be able to state the natural origin of one common product

Materials: No special materials needed

Procedure: (1) Go on a nature hike. Record the resources you see and the uses for each resource. Discuss your findings.

For example:	Resources	Use
	Tree	Wood, paper

(2) In the classroom record the products you observe around you and their origin. Discuss your findings.

For example:	Product	Origin
	Desk	Trees

(3) Discuss this problem, "If no planes or boats come to our town, thus stopping the flow of materials, what would be the effect on our lives?" Make a list of your activities for one day and the products you use. Discuss whether they'd be available if we did, indeed, have no planes or boats.

MATERIALS TRACE—THE WOODEN TOY

Grade Level(s)—2-6

Subject Area—Science

Concept—The effect of manufacturing on natural materials and the environment

Learning Objective(s)—The students will be able to trace a product from its source, to the consumer, and back again.

Materials: Household products brought in by students
Materials Trace—The wooden toy (page 27, Teachers Guide)

Procedure: Ask each student to bring in three products from common household items. Each student will choose one of the items and identify all of the necessary steps to produce a finished product from the raw material. Then each will trace all the steps necessary to recycle the finished product back to its source. Trace this life cycle on the chalkboard or on a large piece of paper.

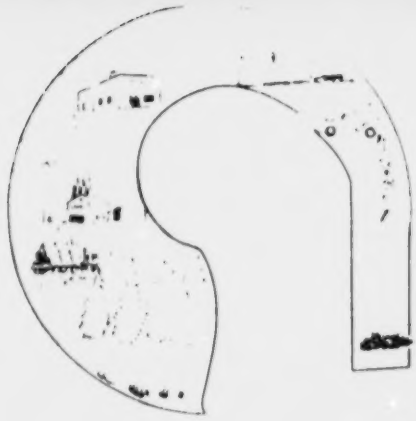
Follow-up Questions: When the students have completed their diagram, discuss the following:

—How many times was it transported? By what?
—What energy was required to transport it?
—How easy is it to recycle?
—Do the items you brought get reused by a second person?
—What are some of the environmental effects of the processing? Of the transport?

Vocabulary: raw material, transport, manufacture, wholesale, retail

Regional Adaptations: This cycle is feasible in all areas of the state except in the most northern areas. It can be pointed out that if the household item is discarded north of the Brooks Range, it is very unlikely that it will ever become nutrients for a tree of any size. This does not mean, however, that the nutrients are lost, but may become feed for an animal on the tundra whose hide, fur, or bone may someday be used again in the manufacture of a household item.

Note: A transparency illustrating the life cycle of a wooden toy is included in the Teacher's Guide



THE LIFE OF AN ALUMINUM CAN

Grade Level—2-6

Subject Area(s)—Social Studies, Science, Art, Language Arts

Concept—Natural resources are finite, recycling prolongs the supply

Learning Objective—Students will be able to describe the life of an aluminum can

Materials:
15 pieces of rock (ore for the mine)
A sand tray to bury the ore
A large box serving as the mill and factory
An aluminum can
Several types of canned foods, several types of food or soda pop, and several empty cans
Shelves (for supermarket) and a cash drawer
Garbage can

Procedure: Set up several stations around the classroom (a sandbox mine, a factory, a cannery, a supermarket, a garbage can dump). Assign different students to staff the stations, and have one be the consumer. Have the consumer ask the supermarket for a can of soda pop. The supermarket in turn asks the cannery which gets the raw ore from the mine. The cannery fills the can with soda pop and delivers it to the market, where it is sold to the customer. The consumer 's request gets all the way back to the mine before the goods can get back to the market.

Discuss the following:
—What has gone wrong with the system to make the rocks run out?
—What happens when you use materials just once?
—What happens when you run out?

Have the students re-design the system so that the materials don 't run out, and the materials are recycled.

Follow-up Activity—Make a mural showing the life-cycle of the materials both when they are thrown away, and when they are recycled.

WHAT ARE RESOURCES WHERE DO THEY COME FROM

Grade Level—2-6

Subject Area(s)—Science, Language Arts

Concept—Waste is created from processed natural resources

Learning Objective(s)—Students will be able to state the natural origin of two products.

Materials:
large bed sheet
4 chairs
4 signs (Plant, Animal, Mineral/Rock, Mineral /Oil)
These signs may be illustrated for younger students.
Common household items (one per student) representing each of the 4 resource categories. For example:

Animal	Mineral/Oil	Mineral/Rock	Plant
wool fabric	plastic plate	ceramic plate	paper plate
leather shoe	plastic doll	glass jar	cotton doll
fur cap	polyester	fork	pencil
	toothbrush	tin can	washcloth
	soap	toy car	newspaper

Procedure: Set up a "machine" by draping a sheet over four chairs, two on each side with a crawl space between.

Choose two students to play the roles of electricity and gas. When a student enters the machine they will make machine-like noises.

Set up 4 stations around the classroom representing each of the resource categories.

Each student will take the role of one of the four natural resources. As each comes to the back of the machine, announce the resource the student will be. Hidden from the class, hand the student a finished product made from the resource. The student enters the machine (which begins to make machine noises), and comes out holding the finished product, which is then deposited at the proper station.

After each student has gone through the machine, have a discussion using the following questions:

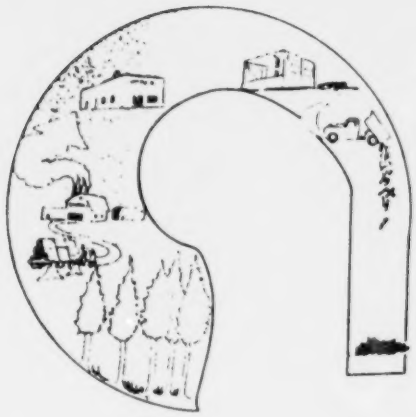
-Where does the oil come from? (dead plants and animals that have been turned into oil by heat and pressure over millions of years)

-Can we grow more oil? (not in our lifetime, as it takes millions of years)

-If you buried the plastic doll, would it go back to oil? (no)

-Can we grow more trees? animals? minerals?

-What can we do to avoid using up all our resources? (recycle and reuse, cut down on disposables, walk or ride bikes instead of using cars)



RESOURCE USE

Grade Level—2-6

Subject Area—Art, Language Arts

Concept—Resource use causes resource depletion

Learning Objectives—Students will be able to suggest alternatives to "burn, bury, dump/litter."

Materials: (1) enough clay for each student to create several small things
(2) 3 small boxes labeled BURY, BURN and DUMP/LITTER

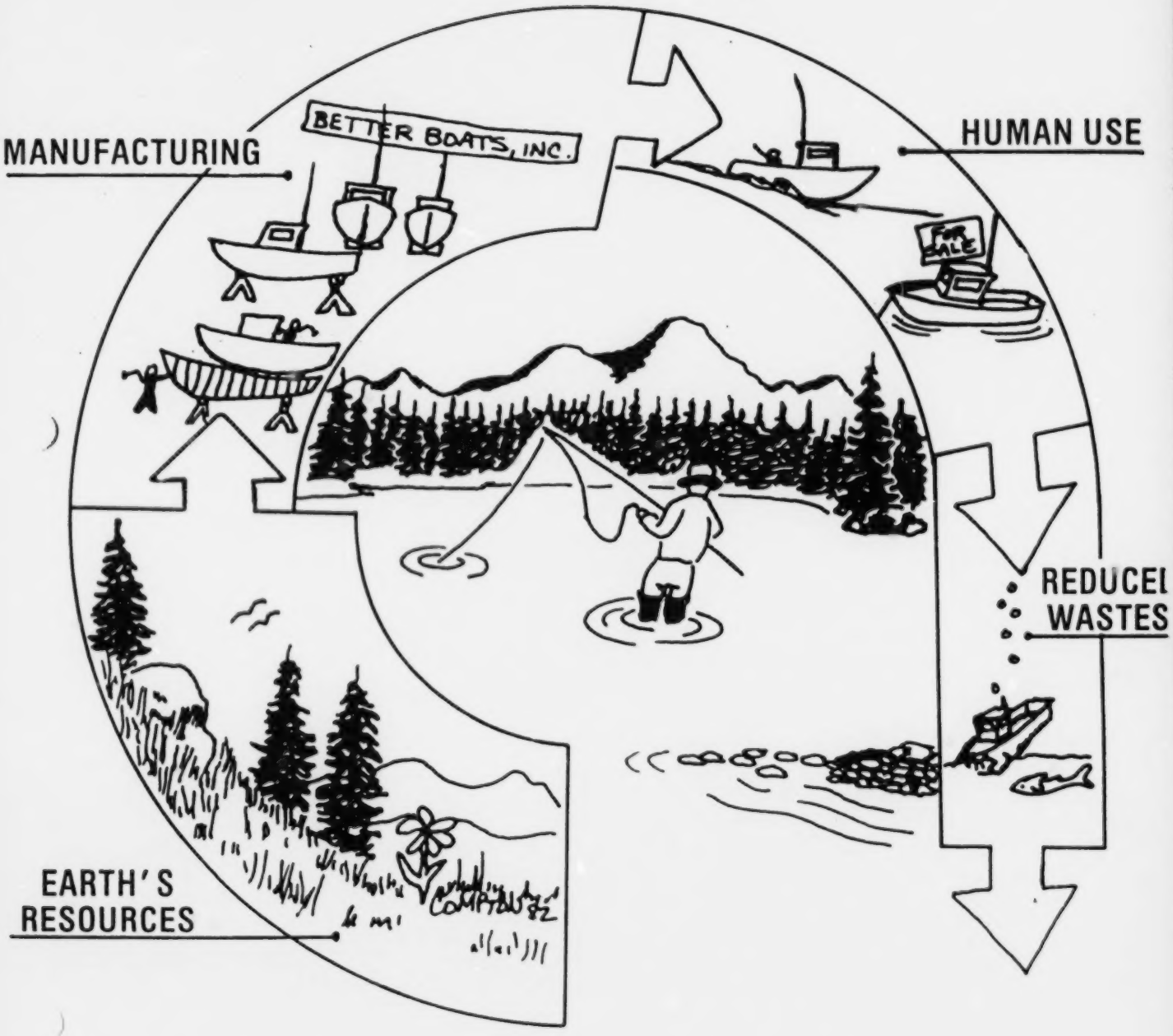
Procedure: Give each student a portion of clay from a container labeled "earth," and instruct them to use the clay to make models of things they like to use. Ask students to place their finished products in one of the 3 boxes. Ask: After we burn, bury, or throw away our car, (for example) what will happen to it?

Repeat several times to show how our use of raw materials (clay, in this case) uses up the earth 's supply of resources. Continue until the clay is all used up.

Lead a discussion focusing on what happens after we burn, bury and dump our litter. Discuss what happens when all the materials are gone: Can we get back what has been thrown away? What will happen if we keep taking materials from the earth? What will happen when we run out?

Suggest that instead of throwing the clay away, it could be reused. If we did this with all our garbage very little would be taken to the landfill and we would not have to take as much from the earth. Ask students for some of their ideas for alternatives to "burn, bury, dump/litter."

REDUCE


MANUFACTURING
BETTER BOATS, INC.
HUMAN USE
FOR SALE
REDUCE
WASTES
EARTH'S
RESOURCES

TO LIVE I NEED

Grade Level(s)—K-6

Subject Area(s)—Social Studies, Language Arts

Concept—People 's wants are unlimited but resources are limited, therefore choices must be made

Learning Objective(s)—Students will be able to state one item previously considered to be "essential" which he/she could live without.

Materials: butcher paper
crayons

Procedure:

(1) Have the students think about the things they do every day and make individuals lists called "to live I need." They will separate the essentials from those things that are just nice to have. List the essentials.

(2) One item at a time, focus on these items, and facilitate discussions about them. Some sample questions might be:
-Where did it come from?
-What are its basic ingredients?
-Are these ingredients found in nature?
-Are they renewable?
-Are they non-renewable?
-Are they made by people?

(3) Design a chart for the items discussed. Sample chart:

Essential Things List	Where Does It Come From? (found in nature? made by people? renewable? non-renewable?)	Basic Ingredients List

Follow-up Activity: Save these charts to exhibit at the recycling fair.

TOO MUCH WASTE

Grade Level—K-6

Subject Area(s)—Social Studies

Concept—The amount of litter keeps growing

Learning Objective—Students will be able to state a relationship between the number of people and the amount of waste generated

Materials: A piece of solid waste (probably a piece of scrap paper), and chairs to delineate the parameter of a square

Procedure: Delineate a square. Ask one child to step into the square holding a piece of solid waste. Emphasize that each person involved cannot step outside the square once he or she is in it. Then ask another to step in, assume they then have two children, those two marry and have two children, etc. The number will grow very quickly, yet the square remains constant. Ask the students how they would be able to get anyone out of the square. As the square grows more crowded, obvious reactions will be observed, especially pushing, restlessness, and general aggressive behavior.

Ask all the students to return to their seats, having first dropped their pieces of solid waste in the square. Ask the students how the square looks. How could they reduce the amount of waste?

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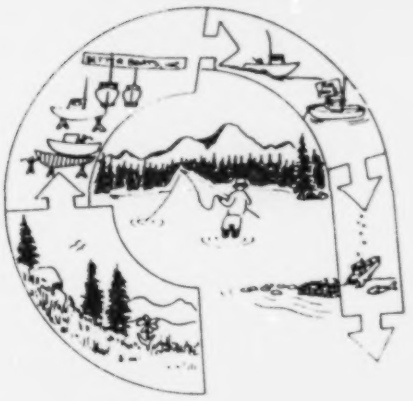

WHAT IS TRASH

Grade Level(s)—K-3

Subject Area(s)—Science, Social Studies

Concept—Our class generates a great deal of trash daily. Trash can be divided into three categories

Learning Objective(s)—Students will be able to state the difference between recyclable, biodegradable and disposable trash

Materials: Collect the trash which accumulates in the classroom after one day. Help the students separate it into three categories: Recyclables, Biodegradables, and Disposables.

Procedure: Recyclables—Discuss some ways that this material can be reused. Sandwich bags can be used more than one time; papers of various types can be reprocessed and reused. Find out how Oscar on Sesame Street is using what other people throw away. Learn his song, "I Love Trash."

Biodegradables—These are materials that will decay over a short period of time. In a plot on a school yard, bury some samples of biodegradable trash; unearth the trash periodically to see what is happening. You might also bring some paper, glass, or metal trash at the same time for comparison. Discuss compost piles and organic fertilizers.

Disposables—This is trash that will not decay and cannot be recycled. Is there some recyclable material that could have been substituted for disposable material? Discuss the local disposal system. What will happen to this trash?

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Vocabulary: recyclables, biodegradables, disposables

Resources: "I Love Trash" is available on record, and words and music can be found in the Sesame Street Songbook, Columbia Book and Record Library. #CC 75006 copyright 1970.

TRASH INVENTORY

Grade Level(s)—3-6

Subject Area(s)—Social Studies, Math

Concept—We all generate lots of trash in a day

Learning Objective(s)—Students will be able to state how much trash they generate in a given period of time.

Materials: None

Procedure: Have students keep a record of everything they throw away during the school day. This should also include lunch and snacks. On the following day, have students read their lists. Put a chart on the board according to the type of materials.

Have students compute how much trash they generate in a week, a month, a school year. If there are multiple classrooms in your school, have them compute the amount of trash generated in the whole school for a day, a week, a month, a school year.

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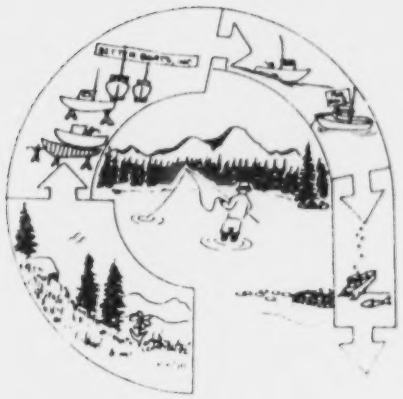


NEIGHBORHOOD LITTER SURVEY

Grade Level(s)—4-6

Subject Area—Science

Concept—Most litter is from manufactured goods

Learning Objective(s)—Students will be able to discuss the kinds of litter common in their neighborhood.

Materials:
paper grocery bags
gloves
at least 6 labeled boxes
scale

Procedure: As a class project, do a litter survey of your neighborhood or school grounds. How much of what can you find? Collect the litter (wearing gloves) and place it in paper grocery bags. Because of potential health and sanitation concerns, skip food waste. (It will decompose naturally at a rapid rate.) Weigh and count the number of bags filled. How much litter did you get? Does the amount surprise you?

What kinds and how much of each kind of litter did you collect? Divide the litter into separate boxes on the ground as follows:

Paper
Metal Cans
Bottles, Jars, and Glasses
Plastic
Wood
Other Scrap Materials

Weigh each box. Which box weighs the most? Also note which box is the most full. Is the box that is the most full the same box that weighs the most? If there is a difference, explain the importance of that difference in waste

disposal. Is there something you can do to reduce the amount of room needed for any pile of litter?

Which kinds of litter will decay outside exposed to rain and sunlight? Of those kinds, which will decay in a few days? In a few years? In hundreds of years? And which will remain practically forever? What accounts for the differences?

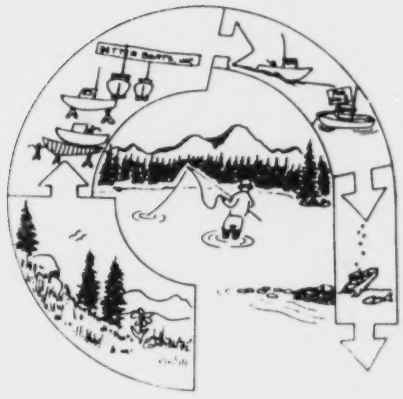
Can all the litter be recycled now? Find out what you can about possibilities (a teacher, librarian, or the sanitation department can help you).

What does your community do with the trash and garbage it collects? Is it put in an open garbage dump or a sanitary landfill? Are there any recycling centers or systems to recover metal and glass wastes? Visit disposal sites and see for yourself.

(P.S. REMINDER TO REMOVE AND PROPERLY DISPOSE OF ALL COLLECTED LITTER.)

Follow-up Activity & Regional Adaptation: This is a very good project for the beginning of the school year and should heighten the student 's awareness of the problems of litter in the community. This can be conducted as written in all areas of the state.

A possible adaptation for heavy snow areas could be to stake out or locate a well traveled area of the school grounds in late winter and collect litter from it as the snow melts throughout the spring in order to demonstrate the "hiding" aspect of successive snowfalls and the resulting mess in the spring.



GARBAGE PICK-UP

Grade Level—1-6

Subject Area(s)—Math, Social Studies, Language Arts

Concept—A great deal of trash is generated by everyone

Learning Objective(s)—Students will be able to describe activities involved in garbage pick-up in their neighborhood. Students will be able to compare the amount of trash generated by families within the observation area.

Procedure: Call the local disposal company to obtain information about their schedule in areas near the school.

Have students make approximately 40 garbage can shaped counters and 20 house shaped counters.

Have students observe collection of a nearby block. Encourage students to notice:

(1) the number of workers on each truck
(2) the roles of each worker
(3) the differences in sound between the garbage trucks and other trucks in the neighborhood
(4) the number of cans at each house (assign one student per house to record the number of cans at that house)

Follow-up Questions & Activities: Where will the truck go when full? (to the landfill) Could one truck get all the garbage for the town? Ask any students who live in apartments to comment on garbage pick-up at their residences.

Have each student who counted cans select the number of can counters that corresponds to the number of cans seen at his or her assigned house and mount them on the chalk ledge. Have the class total the number of cans. (Further extrapolation may be done to determine the number for the whole community.)

Write the numbers 1-5 above the chalk ledge on the board. Have each student place a house counter above the number corresponding to the number of cans at the house he or she observed. This will form a simple graph. Discuss: How many cans did most houses have? Use multiplication or addition to compute the total number of cans. Ask the students how the number of cans they fill at home compares.

VISIT TO A LANDFILL

Grade Level—1-6

Subject Area(s)—Social Studies, Language Arts, Art

Concept—One way to dispose of solid waste is to bury it

Learning Objective(s)—Students will be able to describe a landfill, how it operates and what goes into it

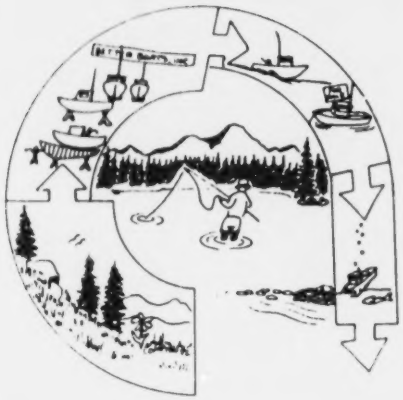
Materials: Art materials-old magazines

Procedure: Arrange for the class to visit the local landfill. Encourage the students to be observant on their trip to this landfill. Generate either an on-site or classroom discussion, using the following ideas (and others if you wish):

—Can you see the site from the main road?
—How does the site look different from the surrounding countryside?
—How many vehicles (working) do you see? Are they all the same?
—How many workers do you see ?
—Close your eyes. What do you hear? What do you smell?
—Where did the garbage come from? (domestic, commercial, industrial)
—What happens to the garbage? Why?
—What kinds of garbage do you see?
—Are houses close to the site?
—Would you like to live near the landfill? Why or why not?
—What happens when it gets filled with garbage?
—What happens to the garbage that gets buried?

Follow-up Activity: Have students make a landfill collage out of pictures from old magazines.

THE MINI-LAND FILL, THE MINI-DUMP



Grade Level—3-6

Subject Area(s)—Science, Language Arts

Concept—Two ways in which waste is disposed of are dumping and burying

Learning Objective(s)—Students will be able to compare decomposition rates of 3 different materials. Students will be able to compare waste disposal in a landfill and in a dump.

Time Frame—4 weeks

Materials:

Several large (1 gal.) glass jars with lids (or aluminum foil)
Several large trays
Pieces of paper towels, magazines, food (orange or banana peel, other food scraps)
Tin and aluminum can pieces
Pieces of plastic, glass, rubber, cloth, cardboard, grass clippings, etc.
Soil, water

Procedure: Have students build a mini-landfill in the container, by burying scraps in the soil of the container. They should be careful to have items near the inside surface so they will remain visible. Allow one inch or so of air space at the top. Moisten the soil and cover the container (soil should be kept moist).

Have students build a mini-dump in the tray by scattering scraps on top of the soil. Moisten the soil (soil should be moistened from time to time to simulate normal rainfall in the area).

Follow-up Questions & Activities: Students will keep a record of mold growth for the various items. They should be aware of:

—Which materials decompose the quickest? How can you tell?
—Which materials decompose the slowest?

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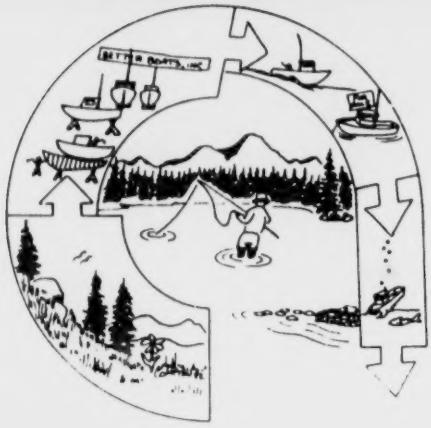
—What might be causing the changes?
—What items are best for placing in a landfill? Why?
—Which items shouldn 't be placed in a landfill? Why?
—What alternatives are there?
—How can we deal with items that don 't decompose?
—Do landfills solve our problem of throwing things away?

Students will compare the differences between the landfill and the dump. Ask them which they think is better for waste disposal.



THE STORY OF THE...

Grade Level—3-6

Subject Area(s)—Social Studies, Science, Language Arts

Concept—Waste is created from processed natural resources

Learning Objectives—Students will be able to describe the origin and processing of one type of litter

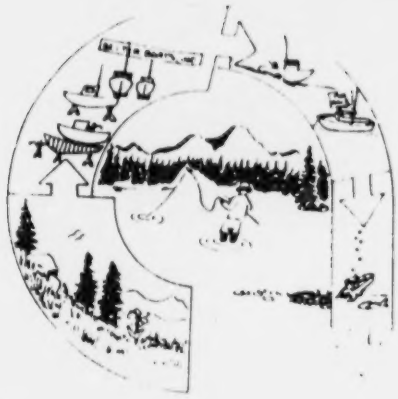
Materials: "The Story of the..." (student worksheets, page 5)

Procedure: Teacher will divide the class into 5 groups, each group representing a common type of packaging. The groups will be:

(1) Aluminum Can
(2) Plastic Bag
(3) Cardboard Box
(4) Tin Can
(5) Glass Bottle

Each group will be assigned to do some research into their packaging type. They should try to answer as many of the questions on the "The Story of the..." sheet as possible (page 5 of the student worksheets).

After completing their research, each group will report to the rest of the class what they have found.



THE ENVIRONMENTAL EFFECTS OF LITTER

Grade Level(s)—K-6

Subject Area(s)—Science, Social Studies, Fine Arts

Concept—Trash is ugly

Learning Objective(s)—Students will engage in an activity to help beautify the neighborhood

Materials: cotton rag
piece of string
paper
peanut butter sandwich
aluminum pie tin
pliers

Procedure: Ask the children to keep an eye open for litter on their way home and to give a report to the class the next day. Choose one spot and walk the class there and pick up all the litter on the way and at the spot. Put it in a garbage bag. Point out how nice the spot looks now.

In the classroom, examine collection and list kinds of litter. How did it get there? What can the children do to keep an area clean? What can they suggest that others can do? Have each child look in his or her desk and around the room.

Draw pictures of area before and after clean up. Write a poem or story to go along with the picture. Maybe the class would like to volunteer to keep a certain section of the playground clean.

Burn a cotton rag, piece of string, a piece of paper and peanut butter sandwich over an aluminum pie tin. Hold with a pair of pliers. Keep children at a safe distance. Is the smell pleasant? Have the children noticed anyone burning anything in their neighborhood? Does it look or smell good?

Follow-up Activity: Have the children list or tell you about the kinds of solid waste. What causes it? What can be done?

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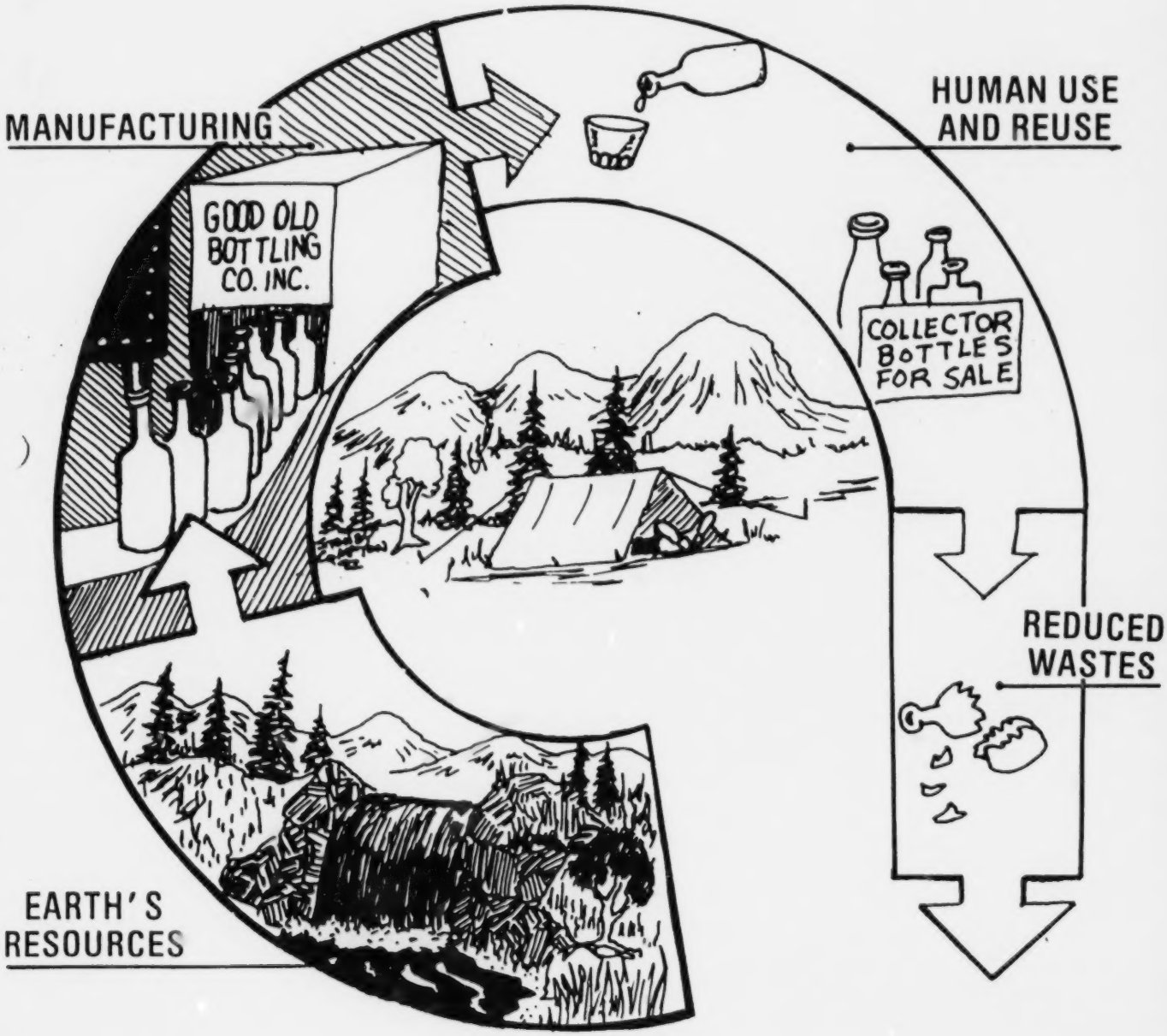
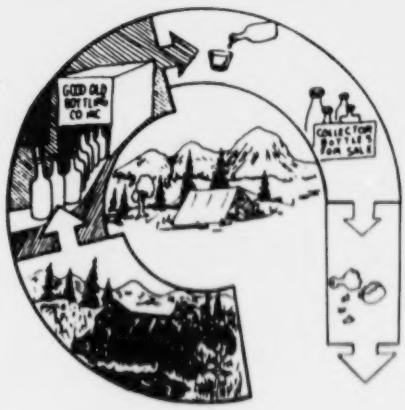
REUSE


MANUFACTURING
HUMAN USE AND REUSE
GOOD OLD BOTTLING CO. INC.
COLLECTOR BOTTLES FOR SALE
REDUCED WASTES
EARTH'S RESOURCES

35



WORD TUMBLES

Grade Level(s)—1-6

Subject Area(s)—Language Arts

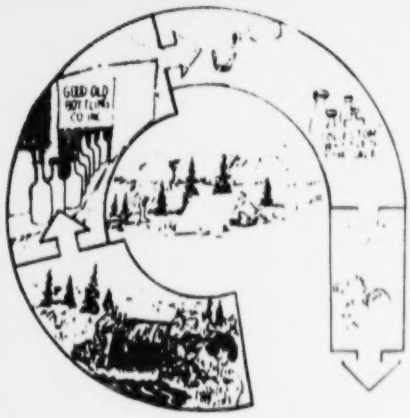
Concept—Vocabulary building

Materials: blackboard
chalk

Procedure: 1) For primary grades, use this as a group project, presenting jumbled words such as; waste, refuse, reuse, reduction, recycle, resource, garbage, environment, conserve, energy, aluminum, glass paper, etc., on the blackboard and solving them together.

Variation: Divide the class into teams and put jumbled words on the blackboard. Teams then see who can correctly unscramble the words first.

2) For intermediate levels, words may be written on the blackboard for students to copy onto their own paper and then solve. This can be done individually, or in small groups.



REUSING PRODUCTS

Grade Level(s)—1-6

Subject Area(s)—Math (from graph construction), Consumer Education, Social Studies

Concept—Many packages which are routinely thrown away can be reused

Learning Objective—Students will reuse packaging

Materials: Bring a number of small, clean, plastic and paper grocery bags to class.

Procedure: Ask the students to take out their lunches and look at how the various items were packaged (i.e. baggies, plastic or foil wrap, waxed paper paper bags). Ask them where the packages come from. Were they bought? What will happen to them when lunch is over?

Pass out the bags you brought, and ask if they could be used to wrap sandwiches. Ask the students if the paper bags could be used again. Ask them if they save the bags at home. Discuss why reusing things is less expensive, and discuss other benefits gained from reusing items.

Instruct the students to begin bringing their lunches in used plastic bags. Construct a graph with each student 's name and record how long the bags lasted.

Discuss the ways that some of the packaging items could be used after they are too worn out to hold lunches (i.e. use paper bags with holes in the bottom to cover books, or recycle them; use plastic bags with holes for vegetables in the refrigerator).

GROWING GARBAGE IN THE CLASSROOM

Grade Level(s)—K-6

Subject Area—Science

Concept—What is sometimes thought of as garbage can actually be a resource.

Learning Objective(s)—The students will be able to describe how old vegetable parts can become attractive plants

Materials: Children can collect from garbage, seeds, scraping, and other fruit and vegetable waste. Attractive planters can be made by decorating empty cans, jars, and plastic containers. Seeds should be sprouted in glass containers without soil but with wet paper towels or a damp sponge so children can see the roots forming. The children can plant things in a well-drained soil mixture. They can experiment with the scrapings to see which, if any, will produce growth. Why did some not grow?

Procedure: Grapefruit, orange, lemon, or tangerine seeds should be planted. They should be in a rich soil, kept damp and in good light, but out of direct rays of the sun. Be sure to place at least one half inch of small stones in the bottom of each planter and make drain holes to allow excess water to drain out.

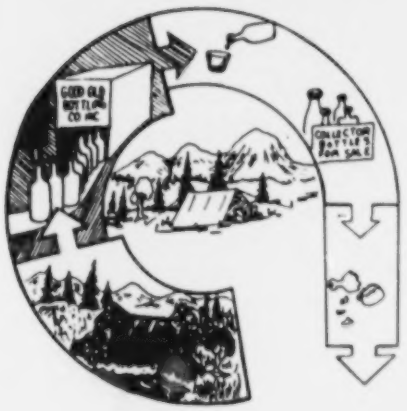
The top of a carrot can be planted in moist sand with only the upper part exposed. This develops into an attractive fernlike plant. With any vegetables, transplanting to an outdoor garden in the spring will be fun and interesting. Pineapple tops can be planted by cutting off the tops (green leaves) with about one inch of the solid fruit portion (this is usually the way they are in the garbage). Place the base part in water with the green top exposed. When roots develop, transplant to a pot with soil and cover with a plastic bag for three weeks (the bag will be in the garbage, too). A small cactus-like plant will develop, and in 6 to 12 months tiny pineapples should develop. Avocado seeds should be planted pointed end up, with the tip just above the soil. It will take a month or two before they sprout.

Seed potatoes, onions, beets, or garlic may be grown by sticking three or four toothpicks around the middle of the vegetable and suspending it in the mouth of a glass jar. Fill the jar with water until the bottom of the vegetable is covered. Keep in a sunny place.

You may wish to transplant seeds later. Remember, an empty egg carton or half-shells of eggs make good planters.

Regional Adaptation: Projects such as this one are conducted in almost every elementary classroom during the school year. Emphasis should be placed on the use of waste products as a resource. Expand this concept to non-vegetable items such as metals and glass.

It will be necessary in Alaska to provide some type of additional light in order to allow proper growth for cuttings and sprouted seeds. Ultraviolet bulbs for all types of light fixtures are available in hardware stores or mail order catalogues.



NATURAL DYES

Grade Level(s)—2-6

Subject Area(s)—Social Studies, Science, Art

Concept—Common vegetables produce dyes

Learning Objective(s)—Students will be able to state one natural source of dye

Materials: Foods used in obtaining dyes can be numerous. Here are some examples that produce beautiful dyes:

Dye Material	Colors Produced
Walnut shells	Subtle buff or adobe
Red cabbage leaves	Beautiful robin blue
Orange peels	A light yellow
Carrot tops	Smoky yellow/green
Fresh cranberries	Dark green
Onion skins	Handsome orange
Spinach	Light gold

Experiment with any number of materials and mix the dye liquid to come up with interesting color combinations. Fresh herbs, leaves of flowers, dandelions, beets and berries of all kinds can also be used.

You will also need chilled, hard-cooked eggs.

Procedure: Ask your class how they would dye Easter eggs if they couldn't get dyes from the store. If you or your students are familiar with natural dye sources in your area, substitute these materials. If not this exercise could also be a thought-provoking introduction to the topic.

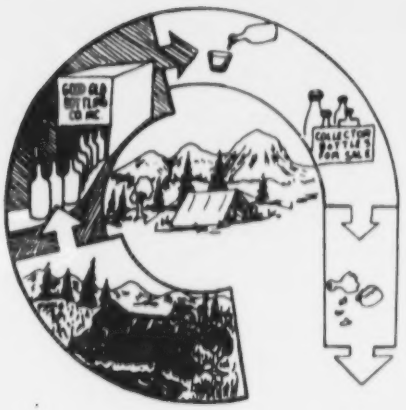
Take a small amount of a foodstuff and place it in a pan filled with 2 cups of cold water. Bring the water rapidly to a boil, allow to simmer 10 minutes,

turn off heat, cover, and steep dye for 30 minutes. Remove food stuff and place dye into containers and refrigerate. Dyes can be kept in the refrigerator for an extended time.

When dye is cold, place hard-cooked eggs into dye. Leaving the eggs in the dye overnight will give the deepest colors. Experiment to see what tints and shades are best.

Remove from the dye and dry on a metal cake rack. Place eggs in the refrigerator promptly after dyeing. Refrigerated hard-cooked eggs can be kept 8-10 days.

Follow-up Activity: Invite an elder to show indigenous plants from which dye can be made.



MAKE YOUR OWN PAPER

Grade Level(s) — K-6

Subject Area(s)—Science, Math, Social Studies

Concept—Old paper can be remade into new paper

Learning Objective(s)—Students will be able to make paper

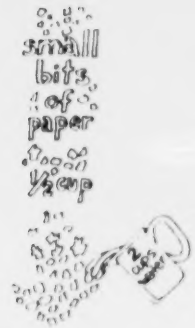
Materials:
10 pieces of tissue or newsprint
A piece of non-rusting screen
A flat dish, a little larger than the screen
4 pieces of blotting paper the size of the screen
A bowl
An egg beater (it works better with a blender)
A round jar or rolling pin
Newspaper & blotting paper
2 cups of hot water
2 teaspoons of instant starch (for stronger paper if desired)

Optional—
Lint from clothes dryer
Torn pieces of cotton (no synthetics)

Follow Up Questions & Activities: Ask your students to speculate how much paper they use in one day (napkins, lunch bags, school work, paper cups, newspaper, etc.). What would life be like without all of these products? At this time there are enough trees to make all of these paper products, but we might not always have an abundant supply of trees. Used paper products can be made into usable paper. This is called recycling.

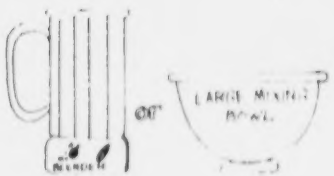
If the paper which has been made is of any quality, it could be employed in a future art project.

Students could demonstrate the steps in making paper at the recycling fair.

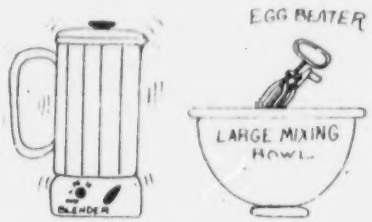


Procedure:

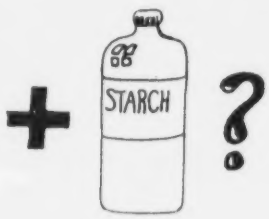
1) Tear the paper into very small bits into the bowl. If you are using lint or cotton, put it in now. Pour in the hot water. 2 cups water to ½ cup of shredded paper is a good ratio.



2) Beat the tissue and water to make pulp.

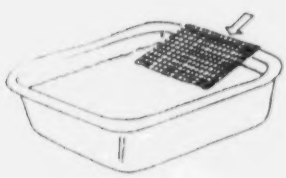


3) Mix in the starch if desired.



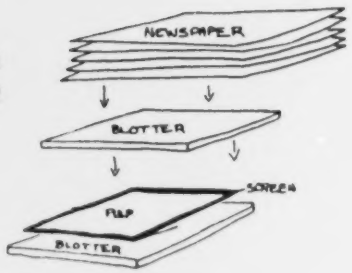
4) Pour the mixture into the flat dish.

5) Slide the screen into the bottom of the dish and move it around until it is evenly covered with pulp.

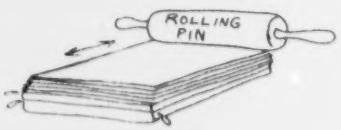


6) Lift the screen out carefully. Hold it level and let it drain for a minute.

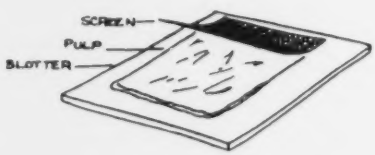
7) Put the screen, pulp side up, on a blotter on some newspaper. Put another blotter over the pulp, more newspaper over that.



8) Roll a jar or rolling pin over the sandwich to squeeze out the rest of the water.



9) Take off the top newspaper. Turn the blotter sandwich over. Then take off the blotter and the screen very carefully. Don 't move the pulp. There is your paper.

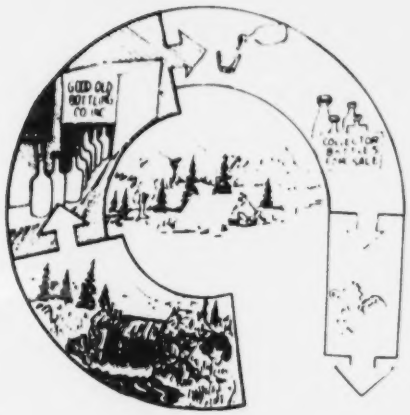


10) Put a dry blotter on the pulp and let it dry.

Of course, your recycled paper is much thicker and rougher than recycled paper made in a paper mill. It doesn 't look like the recycled paper made commercially. This is because paper mills have all kinds of machines to make the paper smooth and flat.

Tips—To save time, most of the pulp can be prepared the night before. If you make it much in advance it should be refrigerated as it will ferment.

To make special occasion paper, add colored threads or put a layer of pulp with a dried flower, leaves or a favorite picture and then another layer of pulp.



FIREPLACE LOGS FROM NEWSPAPERS

Grade Level(s)—4-6

Subject Area—Science

Concept—Old newspapers can be an energy source

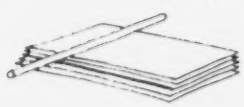
Learning Objective(s)—Students will be able to make fireplace logs

Materials:

Paper (primarily newspaper, but computer paper is excellent)
Twine, yarn or fine wire
Broomstick
Scissors
Bucket or basin
Water

Procedure:

Take approximately eight pages of newspaper and lay them on the floor lengthwise. Lay the broomstick at the top of the newspaper.

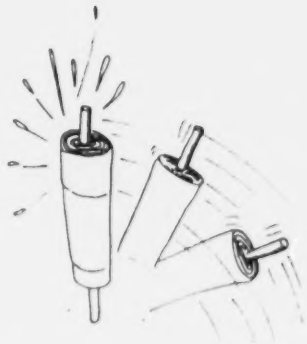


Roll to about 8 inches from the end, overlap another eight pages and continue rolling until you have a good sized log.

Secure with string or fine wire. Colored yarn could be used so that logs will look pretty for gifts or selling.

Soak overnight in water. The water will break down the paper's short fibers and keep fly ash from forming.

Take logs out of the water and bang with broomstick to pack the paper.



Dry logs thoroughly on sheets of newspaper or on racks if available.

An ambitious class or teacher could purchase a small, relatively inexpensive, hand-cranked machine for ease and speed in log formation.

Also, if it is possible to obtain computer printout paper that is the continuous fold type, it can be used to start a log on the roller and then feed the newspaper into it in a continuous overlap.

Some Suggested Uses:

-A money making activity for your class
-As an outreach to older or poor people in the community
-As a source of fuel, if your schools burns wood

MY REDUCE/REUSE STORY

Grade Level(s)—K-3

Subject Area(s)—Language Arts

Concept—Reuse

Learning Objective(s)—Students will be able to discuss reuse of materials

Materials: Old magazines
Used paper

Procedure: Have children go through old magazines and select pictures of things which will ultimately become a waste product (cereal boxes, and other types of packaging, for example). Have the children paste these pictures into a small "recycling" book (made from the paper children have been placing in the box labeled "Reuse").

Have one student dictate a story about reuse and/or recycling of these materials into a tape recorder. Play this tape back and listen to it.

This could be a group project for K levels and either a group or individual project for level 1-3.

REUSE/RECYCLING POSTER CONTEST

Grade Level(s)—All

Subject Area(s)—Art, Language Arts

Concept—To encourage children to consider refuse as a resource

Learning Objective(s)—Students should be able to create a statement about reducing, reusing, and/or recycling

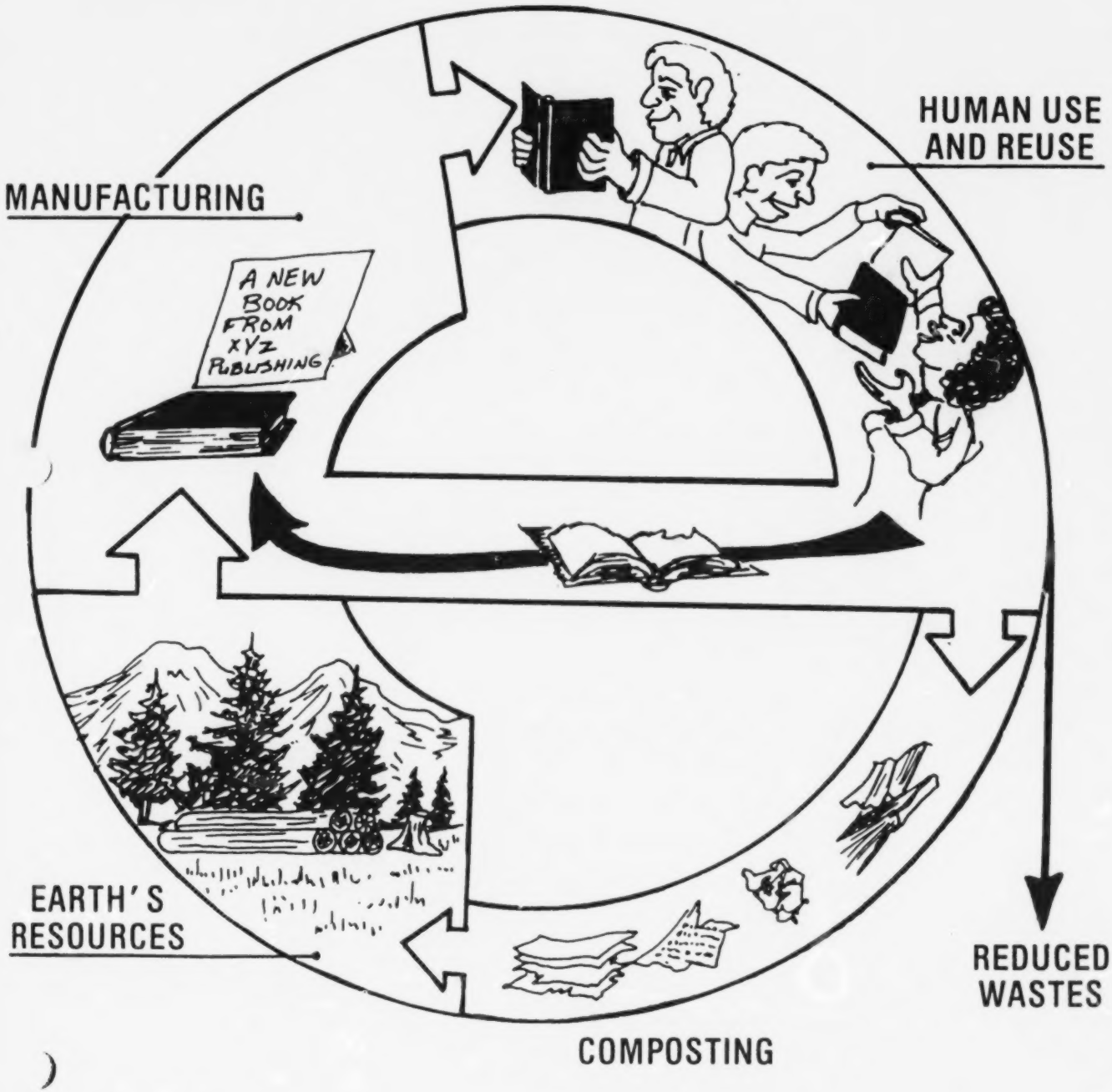
Time Frame—1-2 weeks

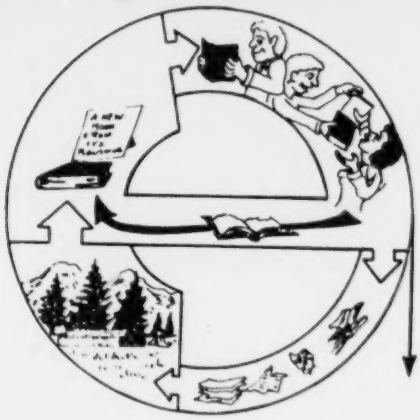
Materials: Paper (encourage use of recycled paper, unused side, etc.)
crayons
markers/paints
award ribbons

Procedure: Initiate a classroom, grade level, or school-wide poster contest dealing with the concepts of reuse and recycling of refuse. Appoint a student committee to select the winners and display all posters with awards attached to the selected winning posters.

Follow-up Activity: Exhibit posters throughout school and community. Exhibit them at the recycling fair.

RECYCLE


HUMAN USE AND REUSE
MANUFACTURING
A NEW BOOK FROM XYZ PUBLISHING
EARTH'S RESOURCES
REDUCED WASTES
COMPOSTING



A VISIT TO A RECYCLING CENTER

Grade Level—1-6

Subject Area(s)—Social Studies, Language Arts, Math

Concept—A recycling center offers an alternative to burn, bury or dump

Learning Objective—Students will be able to describe how the recycling center operates

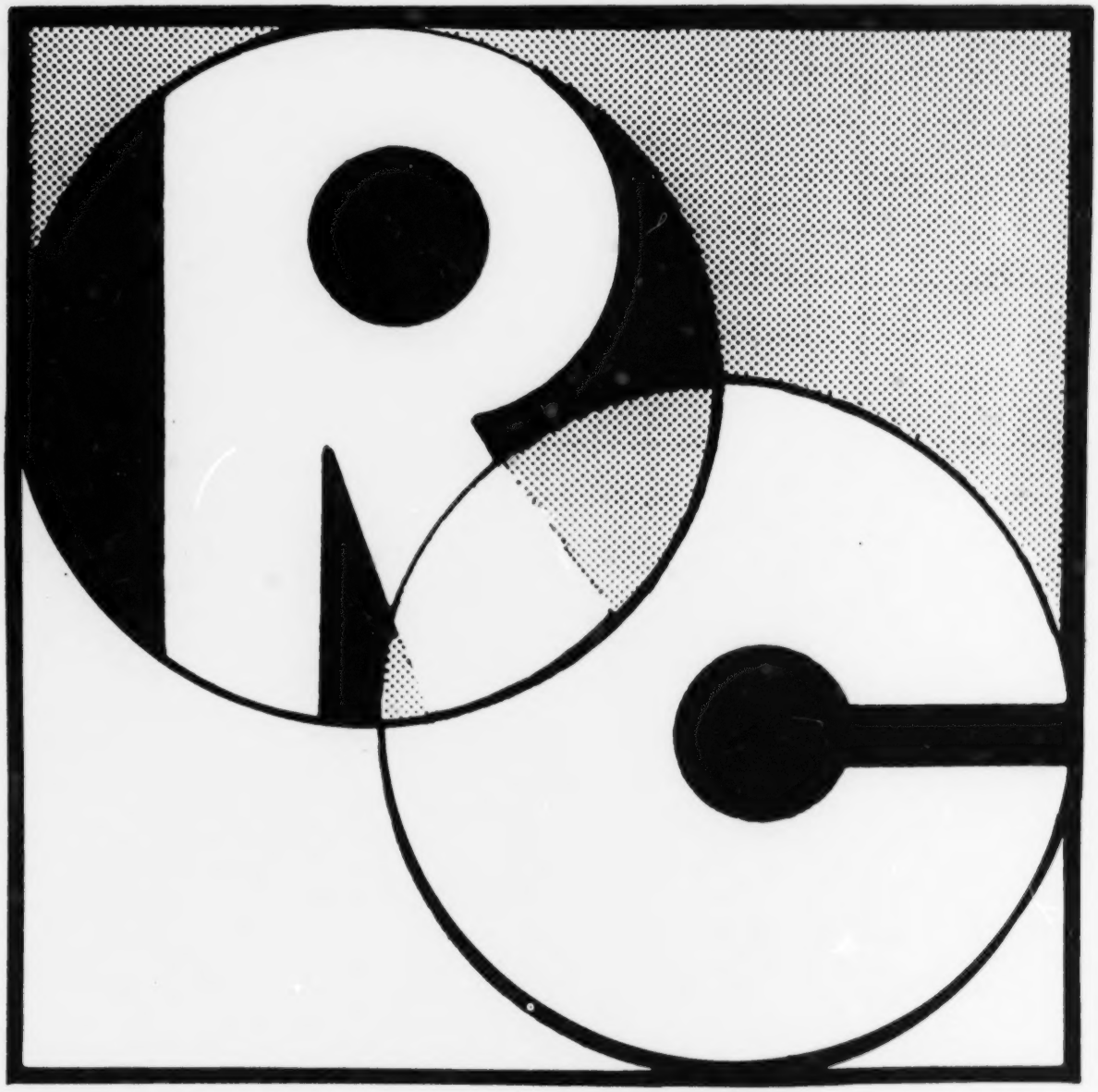
Materials: No special materials needed

Procedure: Contact the local recycling group and arrange for the class to visit their drop-off center. Ask some questions of the contact person to get an idea of how the center operates.

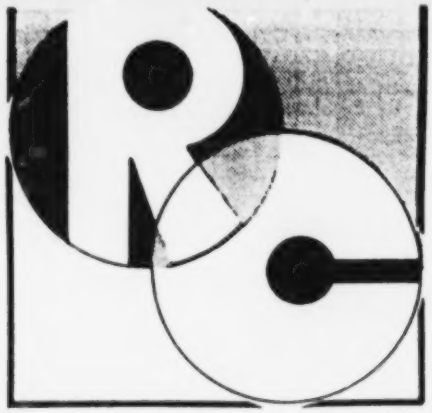
Before going, briefly explain to the students how the center operates. Encourage them to be observant and inquisitive during their visit, asking questions of the center attendant. Possible guidelines for their observation are:

—How many people work at the center? What do they do? Could it operate unattended?
—What items are being recycled?
—How many people visit the center in a day? (Students may wish to expand this to find out how many come in a week, year, etc.)
—What happens when the barrels or bins are full? Where are the recyclables taken? What happens to them?

Follow-up Questions & Activities: Generate a discussion about the experience. Set up an aluminum can collection center.



RECYCLED CLASSROOM



PLASTIC WORD EGGS

Grade Level(s)—1-3

Subject Area— Language Arts

Concept—Reuse

Materials: plastic egg-shaped containers used as packaging for a popular brand of panty hose
grease pencil or something else that will write on plastic

Procedure: Write a graphemic base syllable (such as "ill") on the narrow end of the egg and a variety of appropriate initial consonant sounds on the wide end of the egg ("f", "h", and "m", for example). A child can then rotate the halves of the egg and read off the complete words as they appear.

When child has read all the words correctly, he can open the egg - and discover slips of paper containing sentences using the words in context.

ODDS AND EVENS

Grade Level(s)—K-3

Subject Area—Math

Concept—Reuse

Materials: bottle caps (each set requires 24 caps)
box(es)

Procedure: Have children save bottle caps and bring them to class. Write a numeral from 1 to 12 on each cap and place them in a box. Two children, or two teams, play at a time. One player draws 2 caps from the box and adds, subtracts, or multiplies (teacher designates) the 2 numbers. If the answer is odd, player #1 (or team) gets the caps. If the answer is even, player (or team) #2 gets them. The player or team with the most caps is the winner.

DECORATOR BOTTLES—REUSE OF BOTTLES

Grade Level(s)—K-3

Subject Area—Art

Concept—Reuse

Materials:
empty glass bottles (wine, juice, etc.) (washed at home)
glass jars (washed at home)
tissue paper scraps (colored)
cloth scraps
dried seeds
glue

Procedure: Have the children bring the empty glass bottles and jars from home. Provide them with a variety of the other materials (tissue paper & cloth scraps, & dried seeds).

The children should "paint" glue all over the surface of their bottle and, using one of the materials above, cover the entire bottle with this material.

Use as vases, candle holders, etc. The wide-mouthed jars can be used as pencil holders, etc.

TIN CAN WALKERS

Grade Level(s)—K-3

Subject Area—Large Muscle Development

Concept—Reuse

Materials: tin cans (coffee, or 48 oz. juice cans are the best)
rope (about five feet for each can

Procedure: Puncture the cans on 2 opposite sides, close to the top. Thread about 5 feet of rope through the holes of each can. Stand on the cans, hold the ends of the rope. Tie them about waist height and WALK!

MEAT TRAY STITCHERY

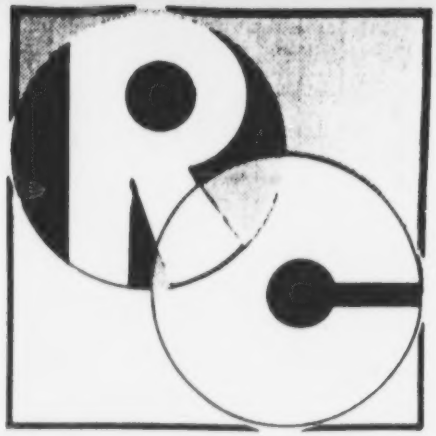
Grade Level(s)—K-3

Subject Area(s)—Art, Fine Motor Skills

Concept—Reuse

Materials: empty, clean meat trays
scrap yarn
large needles

Procedure: Have the children bring in the empty, clean, meat trays and scrap yarn from home. Provide them with the large needles. Have the children sew with the needles and yarn in the meat trays - create designs/pictures as their ability and interest allows. These can be hung up in a display when complete.



PILLOW OR QUILT

Grade Level(s)—K-6

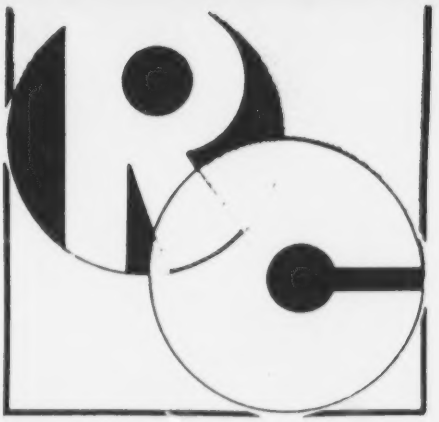
Subject Area—Art

Concept—Reuse

Materials: odd fabric pieces
crayons or markers

Procedure: Ask the students to bring in odd fabric pieces or sheeting from home. Have them make illustrations on these pieces with crayons or felt-tipped pens.

These can be sewn to other fabric pieces and stuffed for personal pillows. Students can use them for relaxing during silent reading. They could also be used by sewing all the illustrations together, back the finished product with an old sheet, then stuff it. This makes a student-made quilt to display at the recycling fair and/or to auction of as a money-making project.



EGGSHELL PLANTERS

Grade Level(s)—K-3

Subject Area—Science

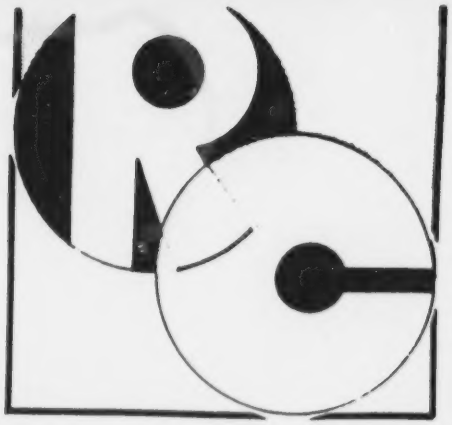
Concept—Reuse

Time Frame—Initial preparation and planting will take about 30 minutes. Growth time will vary with seed types used.

Materials:
- washed, empty eggshell halves
- empty egg cartons
- soil (fresh)
- seeds
- water

Procedure: Have children bring empty eggshell halves that have been rinsed out at home. Place a small amount of fresh soil in each half. (Use empty egg carton to hold the shells. Egg cartons may first be decorated by children before placing eggshells with soil in them.) Plant with small seeds and water lightly.

Use for starters—as plants begin to grow the shell and all can be planted—the shell will decompose and nourish the soil.



MUSICAL INSTRUMENTS

Grade Level—K-3

Subject Area—Music

Concept—Reuse of waste materials and encourage musical participation

Learning Objective(s)—Reuse

Time Frame—30-45 minutes

Materials: See below for specific instruments plus:
dried beans
rocks
construction or recycled paper
crayons or markers
stapler
waxed paper
rubber bands
heavy plastic or vinyl

Procedure: Have children bring the following materials from home as appropriate for the particular musical instrument to be made

a. Tambourines	-	2 aluminum pie tins from pot pies, etc. or 2 paper plates, bottle caps
b. Castanets	-	bottle caps, or baby food jar lids
c. Banjos	-	cigar boxes, shoe boxes
d. Maracas	-	small empty containers with tops
e. Drum	-	coffee cans or other cans
f. Flutes	-	empty toilet paper or paper towel rolls

Put the instruments together (see following instructions for individual instruments).

Play a record or tape and have children play their instruments and march with the music.

Instrument Directions:

A. Tambourine - Have child draw colorful designs on the backs of 2 paper plates, or aluminum plates.
Put 3 or 4 bottle caps between the plates-front sides together.
Staple all around the edges of the plates and shake!

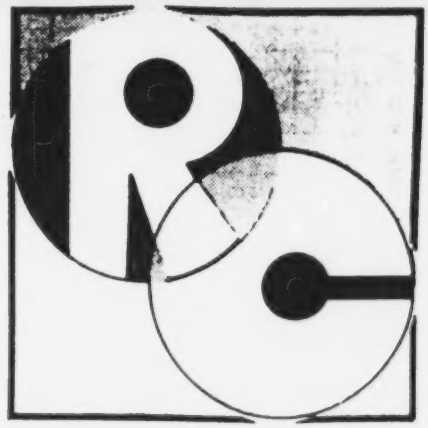
B. Castanets - An adult must poke 2 holes in each bottle cap or jar lid about ¾ " apart.
Lace yarn or string through holes, leaving a finger space on outside.
Tie the yarn/string together and click away!

C. Banjo - Remove the cover from the box
Stretch rubber bands around the box lengthwise.
The tighter the rubber band, the higher the sound.
Decorate the side of the box and strum.

D. Maracas - The loudness will depend on the type of container and what is put in it.
Very loud - tin cans and rocks
Loud - plastic containers and dried beans
Quieter - cardboard container and rice
After filling the containers with a handful of rocks, beans, etc., tape the top securely and decorate the maraca. Shake!
Variation—Plastic lemon and lime juice containers with screw tops work well, too.

E. Drum - Cut both ends from the can and cover with a piece of recycled or construction paper, taping securely.
Decorate with markers as in an Indian design.
Cut 2 circles about 2 " larger than the diameter of your can from heavy plastic or vinyl. Punch 8 holes evenly spaced around the circle.
Place circles over the top and bottom of the can.
With yarn or string, begin to string the top circle to the bottom circle, making sure the holes are in between each other so yarn will form a V. Tie yarn tightly.

F. Flute - Let children carefully decorate the paper rolls with markers.
Poke 3-4 holes in the roll.
Cut a circle from wax paper about 2 " larger than the diameter of the roll.
Put the wax paper over one end and secure with a rubber band.
Have children hum and/or blow into the roll.



CANISTERS

Grade Level(s)—K-3

Subject Area—Art

Concept—Reuse

Materials:
empty coffee or other tin cans
construction paper
common objects such as keys, paper clips, etc.
vegetables (green pepper, potato, onion)
sponges (cut in shapes)
glue and/or tape
paint

Procedure: Have the children bring the empty cans from home. The construction paper should be cut to fit each can. Using the common objects, vegetables, and/or sponge pieces, children print a design on their paper by dipping these objects into paint and pressing on the paper. When the paint is dry the paper is glued or taped onto the cans. These make colorful cannisters for holding all manner of things.

Some of the activities in this handbook have been adapted from:

Connections: A Curriculum in Appropriate Technology for the Fifth and Sixth and Grades, National Center for Appropriate Technology, 1980.

Let's Recycle! -- Lesson Plans for Grades K-6 and 7-12, U.S. Environmental Agency, 1980.

The Recyculum -- A Resource Conservation Curriculum for Grades K-6, Eco Alliance, 1980.

Reduce, Reuse, Recycle -- A resource Guide for 5th and 6th Grade, Yamhill Valley Recyclers, 1977.

The Trash Monster - Environmental Education Program, California State Solid Waste Management Board, 1980.

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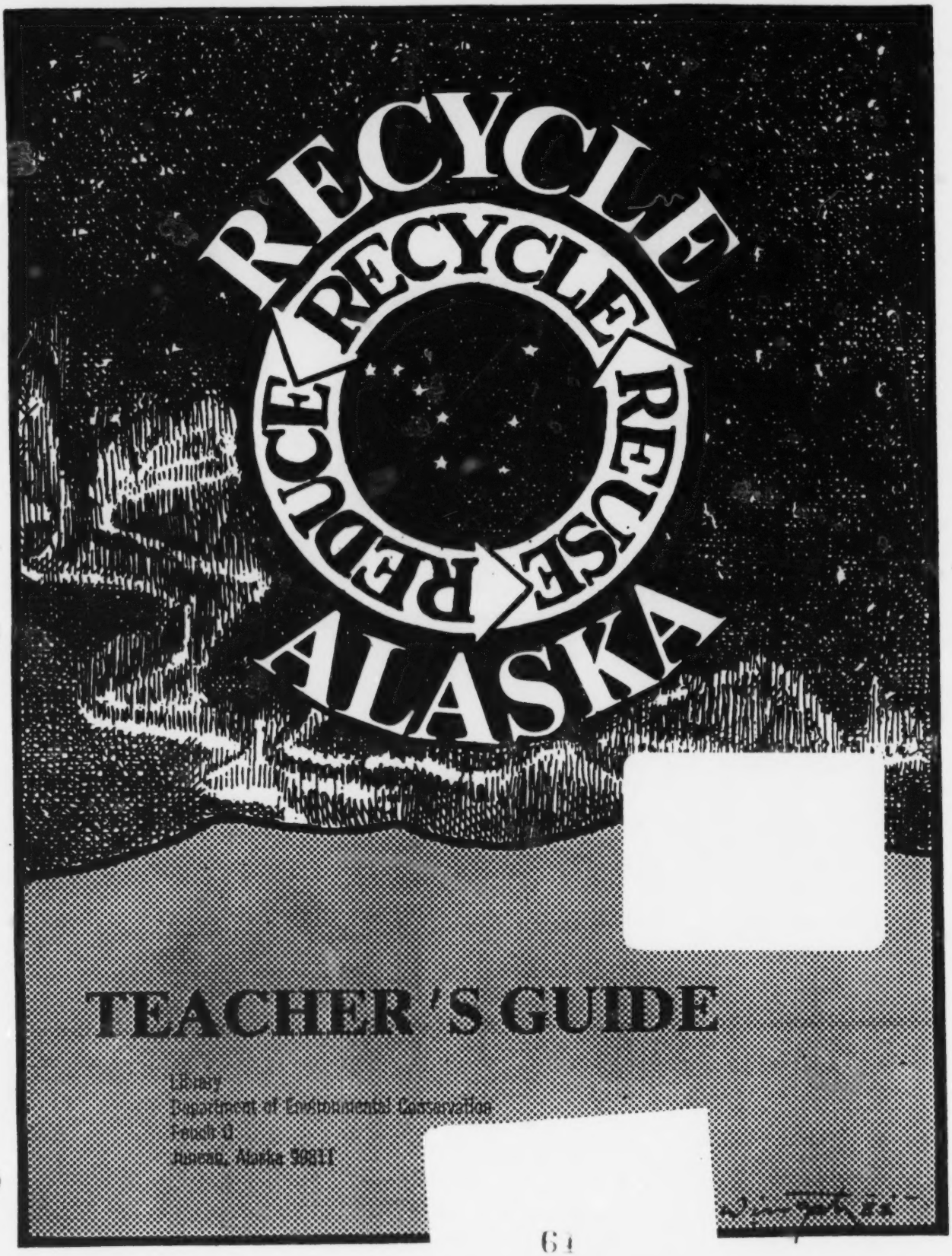

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TO THE TEACHER

Litter is blotting our Alaska landscape. The problem has become so bad that a national news network recently labeled Alaska "the trashiest state in the union."

Actually litter is a problem throughout the United States. It's just very visible here in Alaska. In the United States today, we often discard items which in an earlier time would have been repaired or saved for other uses. In fact, most modern products are designed to be used for a short time and then thrown away. Americans generate so much trash each day, that if it were collected and put in the New Orleans Superdome, it would fill the Superdome from floor to ceiling twice each day, every day of the year.

It is important for us all to practice the 3R's—Reduce, Reuse, and Recycle. It saves money and helps to make our city, our town or village more beautiful.

The materials in this kit have been designed to provide anti-litter, anti-waste education for children in all Alaskan environments. The most important outcome of this education is a change of attitude on the part of the students, as evidenced by a change of behavior. The activities in this kit are designed to mold attitude. But as we all know, attitudes are caught, not taught. If the teacher, a very important adult in their lives, believes strongly in reduction of waste and litter, all classroom practices will show that influence. (For classroom recycling ideas, see the section on the recycled classroom [pps. 10-11].) Activities and materials in this kit will help you to focus the classroom ambiance and give the students ways to express their own ideas on litter and waste control.

Some of the learning activities suggested here are suitable only for rural villages, some for urban communities, and some for either. No attempt has been made to separate them, because every community in Alaska has unique combinations of resources and problems. Please do your own sorting. Because of differences in regional ecology some of the science activities have a regional adaptation available. This is noted at the end of the exercise.

INTO THE CURRICULUM INTEGRATION

The most natural way to teach about prevention of litter and waste is for the subject to result from a concern or interest of the students. The opportunity may arise out of a chance event, or as an extension of class studies in science or social studies, or even a story, movie, or TV show. For example, concerns might be raised about the rate at which people are using up the earth 's resources (animals, trees, oil, minerals, for example).

If the topic doesn 't arise spontaneously, it can be introduced from almost any curriculum area, then extended to the others. In science, observation of the cycles of generation, decay, and reuse in nature leads to the question of how humans have interfered with that cycle. Social studies can point out the history of resource consumption, or waste disposal can be studied as a problem in civics. Contemporary literature, especially science fiction, often explores humanity 's future postulated on present habits.

All of this is to say there is no best order in which to introduce the learning activities suggested here. Select from them any that suit you and your class, in any order.

ABOUT THESE MATERIALS

This Kit contains:

1. Teacher's Guide
2. Activities Handbook
3. Student Worksheets
4. Alaska Recycling Guide
5. Comic Book/Home Information Leaflet
6. Recycler Puppet

This teacher's guide contains an overview of the topic with references to activities in the Activities Handbook, tips for making and using the puppet characters, and answer keys to the student worksheets.

The curriculum is designed around four broad topics:

1) Awareness of Natural Cycles
2) Reduce
3) Reuse
4) Recycle

A fifth section, the Recycled Classroom, provides some ideas for reusing trash in the classroom to support broad curricular goals.

AWARENESS OF NATURAL CYCLES

Nature's way is cyclic. Plants draw nutrients from the soil, animals eat plants and return nutrients to the soil through their body wastes, plants and animals die and decay thus enriching the soil. Plants give off oxygen which animals take in, animals expell carbon dioxide which plants take in. Everything is used, nothing is wasted. Nature is the perfect recycler.

Humans tend to interrupt these cycles. Some of the things we manufacture either decay very slowly or not at all. These are non-biodegradable wastes.

In this first section, students will be encouraged to examine nature's cycles and the impact that humans have on them. They will be introduced to the term biodegradable and examine what kinds of goods are biodegradable over what length of time.

Activities to support this section will be found on pages 3-10 of the Activities Handbook.

Goal I—Students will be encouraged to understand nature's cycles and the way nature recycles.

Object 1.1—Students will be able to state one way in which nature recycles.

HUMAN IMPACT ON NATURAL CYCLES

Creating the goods that we commonly use in our lives interrupts Nature's cycle. Humans take natural resources from the earth and use them to manufacture products which cannot be reused. The result is unsightly litter and diminished disposal area.

In this section, students will be encouraged to assess the impact of humans on the immediate area in which they live. Many of the changes over the last one hundred and fifty years have come through the use of manufactured goods. Often, we forget that these products are manufactured from natural resources. Students will be encouraged to look at products they commonly use and understand that they come from natural resources. Many products are no longer biodegradable when they emerge from the manufacturing process. Students will be encouraged to look at what happens to products after they are used.

Goal II—Students will be encouraged to assess the impact of humans on natural cycles.

Object 2—Students will be able to state one way in which humans interrupt natural cycles.

Goal III—Students will be encouraged to understand that manufactured products originate from natural resources.

Activities to support this section will be found on pages 13-19 of the Activities Handbook.

REDUCE

Much of the waste we generate is from packaging materials. The use of plastic shrink wrap, styrofoam trays, cans, bottles, boxes and bags (to name a few) is growing three times faster than the population.

—50% of all U.S. paper products
—75% of all the glass production
—14% of all the aluminum production
—29% of all plastics
—9% of all the steel production
go into packaging.

Not only does all this packaging contribute to waste and litter problems, it is expensive as well.

—36% of the cost of baby food is the container
—12.7% of the cost of toilet articles is the container
—10.2% of the cost of cookies and crackers is the containers
—8.9% of the cost of soaps and detergents is the container
—9.9% of the cost of polishes and cleansers is the container

In this section, students will be encouraged to look at their own consumption and buying habits. They will look at their own use patterns in the classroom, and the larger use pattern in the community. What kinds of materials constitute neighborhood litter? How does the community handle garbage? Is it burned, buried, and/or dumped? If it is buried, is there a problem of diminishing sanitary landfill space? Lastly, students will be encouraged to think of ways to reduce the amount of litter in the community.

GOAL IV—Students will be encouraged to examine their own consumption; to be aware of the amount of trash that they generate daily; and to think about ways they could alter their buying and use habits.

GOAL V—Students will be encouraged to think about the problems created by diminishing sanitary landfill space (where appropriate).

GOAL VI—Students will be encouraged to think in terms of "community beautiful" and how they can actualize it through their own efforts.

Objective 4.1—Students will inventory the waste products they generate in a given period of time.

Objective 4.2—Students will be able to give at least two examples of ways in which they can reduce the amount of litter they generate.

Objective 6.1—Students will demonstrate community pride by devising ways to make their environment more beautiful.

Activities to support his section will be found on pages 23-34 of the Activities Handbook.

REUSE

In our grandparents day, reuse was the norm. However, as our society has become more affluent we have become a "throw away" society. Belatedly, we are learning that grandmother had the right idea.

The following section is designed to encourage students to think before they throw it away. Concurrently, it is also to encourage you and your students to think of ways to make yours a recycled classroom.

GOAL VII—Teachers and students will be encouraged to look at classroom trash as resources waiting to be reused.

GOAL VIII—Students and teachers will be encouraged to look at trash from other sources and identify and recover that which could be reused in the classroom.

Objective 7.1—Students will engage in on-going reuse of classroom which can be reused in the classroom. (all grades)

Objective 8.1—Students will be able to identify and recover materials that are trashed outside the classroom which can be reused in the classroom. (all grades)

Objectives 7.2 & 8.2—Students will engage in at least one hands-on reuse project. (all grades)

Students should also be encouraged to reuse material in their daily life outside the classroom. Some ways you can encourage this are ;

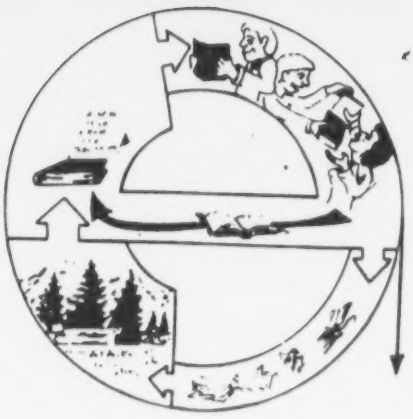
(1) Discuss ways families already reuse materials, such as plastic margarine cups, screw-top jars, paper bags, etc.

(2) Start a local column of "Helpful Household Hints" in the classroom or better yet, the school paper. Collect such columns from the local paper and select the best ideas for reusing, according to the students, and add their own ideas.

(3) Have a contest for the best idea submitted each week for reusing something (judged anonymously, of course, by a committee of students). Post the winning idea each week in the room, or in the newsletter to parents.

GOAL IX—Some families will be drawn into reuse/recycling activities.

Activities to support this section will be found on pages 37-49 of the Activities Handbook.



RECYCLE

A step beyond reusing materials is recycling them. Recycling is defined as salvaging materials so that they can be manufactured into other products. Recycling begins after a product has reached the end of its primary usefulness. Examples of items that are often recycled are bottles, cans, tires, batteries. These can then be collected, sorted and transported to be used once again in the manufacturing process. Organic materials are recycled through composting.

Opportunities for true recycling vary greatly through Alaskan communities. In most cases it is only viable to recycle aluminum. Even then transportation to buyers in Anchorage, Fairbanks and Seattle can be a problem. However, many airline and barge companies have been willing to backhaul recyclable materials to market for very low rates. If you live in a community that does not recycle, your class could set up a recycling project. Your students would be providing a valuable community service and money generated can go to class or school projects or could even go to the students themselves. The booklet *Alaska Recycling Guide* (included in this kit) will tell you how you can set up a recycling center. The Alaska Department of Environmental Conservation will provide any technical assistance that you may need.

If you live in a place where little true recycling is possible, students can at least be aware of the principle, and know that it is feasable in most places with large populations (who also use a large portion of the resources).

1. Discuss recycling with your students. Use the word recycle frequently. Encourage students to integrate it into their vocabulary.

2. Write the word recycle on the board or a large sheet of paper. Ask students what other words they know which are similar. Draw a bicycle wheel on the board. Point out that the root "cycle" is common to both words. Just as a bicycle wheel goes round and round so things that are recycled are used over and over.

3. Encourage students to participate in existing recycling programs if your community has one. If your community doesn't have a recycling program, encourage students to start one.

Goals:

X. Students will engage in activities which compare the cost of primary manufacturing and recycling. (all settings).
XI. Students will actively participate in the local recycling effort. (urban settings and those rural settings where recycling is already occurring)
XII. Students and teachers will begin a community recycling project.

Objectives:

10.1 Students will be able to compare the energy consumption involved in primary manufacturing versus recycling aluminum. (grades 4-8)
11.1 & 12.1 Students will participate in a hands-on recycling project. (all grades)

Activities to support this section will be found on page 53 of the Activities Handbook.

THE RECYCLED CLASSROOM

Many items that are commonly trashed can be used as resources in the classroom. Doing so will encourage students to look at trash with new eyes and also extend the resource available to you.

IDEAS FOR REUSE IN THE CLASSROOM

1. Have a box for used paper that can still be used for scratch paper (on the other side). Encourage students to contribute to it and to use from it for rough drafts, computations, etc. Use it yourself!

2. Keep another box for used wrapping paper, grocery bags, fabric scraps, and other flat, decorative materials.

3. Keep one or more boxes for other reusable objects. Milk cartons, plastic jugs and bottles of all sizes, cardboard tubes from paper rolls, cereal boxes, cans, egg cartons, spools, buttons, discarded hardware and costume jewelry, scraps of braid, etc. Be sure students wash containers before they go into the box.

If you have access to stores that sell wallpaper, adhesive paper, or other decorative items, find out if they will let you have any such items they discard, such as sample books and damaged materials. Add these to the crafts box.

All of these are useful in a multitude of craft projects, such as building towns, models etc. In addition:

Plastic jugs, "cut in half", make good scoops (for sugar, potting soil, etc.) or funnels, depending on which end you save.
Bottle caps can be playing pieces for a student-made game, or bases for student-made figurines.
Use TV dinner trays as desk organizers.
Decorate cans to hold pencils, etc.
Make hanging candle lanterns out of cans.
Containers for house plants, hanging or standing, can be made of milk cartons or aluminum cans.
Cover boxes with scrap fabric or other decorations, to store school supplies, sewing notions, jewelry, scrap paper cut into handy note size, etc.
Many kinds of plastic or glass containers may be reused in science projects, as animal cages, aquariums, planters, ant farms, storage of materials, display of collections, etc.

USE FOR NEWSPAPERS

Papier-mache (used paper towels, too)

Rolled up as miniature logs for model log cabins

Wrapping paper, shelf and drawer lining, protection under messy projects, emergency insulation, etc.

Sources of lesson material:
Grocery ads for math problems
Want ads to spark career discussions, letter of application, etc.

Interesting stories, pictures with captions, even comics can be clipped and mounted to attract readers. They can be "job cards," or students may choose an article, read it, write questions about it, then pass it to the next student for answers.

Have each student take a newspaper, then give a prize for every misspelled or missing word found during a limited time period.

Let students guess how many times a given word or class of words will occur in a certain number of column inches of the front page. Then let them count and check their guesses.

Use newspaper articles for examples in study of grammar and usage.

Some stories make good stimulators of ideas for writing, fiction, nonfiction, and poetry.

Current newspaper articles lead naturally to topics in geography, history, or economics.

Fairly recent newspapers can be sources for student research.

Activities to support this section will be found on pages 57-64 of the Activities Handbook.

THE COMIC BOOK

Included with this kit is the *Litterbagger Meets Recycler* comic book. It has been designed to stimulate student's thoughts about reuse and recycling. Additionally, it has been designed to be taken home and shared with parents. As previously noted one of the goals of this project is to draw some families into litter reduction activities. The comic book should serve as a family discussion starter.

STAGING PUPPET SHOWS

The puppet stage is the place where puppets perform. The main purpose of the stage is to direct the attention of the audience to the puppets. It also hides the puppeteers, the back stage clutter, and puppets about to make surprise entrances.

There are many possibilities for simple stages: a work table turned on its side, a sheet hung in a doorway, a small table screen, or a large appliance box.

The most important element of the stage is the opening where the action is viewed, often called the proscenium. This opening needs to be high enough from the ground to cover the puppeteers heads and wide enough to allow four or five puppets to be on stage at one time. The opening has to be high enough to allow for puppet action. An 18" puppet should have a 24" to 30" opening.

If you simply turn a table on its side you would control the hiding of the puppeteers by having them sit on chairs or stools. This table could be placed facing away from the blackboard and scenery drawn the board with chalk. The legs could be covered with material on large sheets of paper to further hide the back stage action. The addition of some clamp-on lights clamped to the back of two chairs placed on each side of the stage and directed towards it could create an attractive atmosphere.

Cardboard cutting boards used for home sewing on their sides could be decorated to make a more permanent stage. The puppeteer heads would be hidden by having them sit on short chairs or stools. Again, lights clamped on chairs would add a great deal.

A large appliance box could be modified by cutting holes for the puppet action and for an entrance. This stage would have several advantages. A curtain could be mounted inside so that the opening could be opened or closed to heighten the dramatic action.

Lights could be mounted on the box, directed at the opening, either from inside or outside. The large appliance box would allow a number of opportunities to recycle found objects. Empty tin cans could be used to house the lights. Scrap material or clothing could be used for the curtain. The Litterbagger Meets Recycler comic book has some sketches of what such a stage might look like.

The school library should have several books on puppetry that would give more specific details on stage construction.

PAPER BAG PUPPETS

Paper bag puppets are just that, puppets made of paper bags. Sandwich lunch bags are the most convenient size.

The very youngest children can decorate them with crayons. Older children can glue cut-out features; yarn, buttons, feathers, and/or beads to create a variety of characters.

The child places a hand inside the unopened bag letting four fingers slide into the flap. When those fingers are flexed the puppet will appear to talk.

A Litterbagger puppet could be made by using the comic book character as a model.

HAND PUPPETS

Included in this packet is a preprinted hand puppet of Recycler. The student will need some pins, a needle, thread, and some stuffing material (recycled nylons or material scraps) to complete project.

Pin the two sides together inside out. Starting from the top of the head and stitching down, the two halves of the body are sewn together. The other side is sewn and, of course, the bottom is left open. Extra stitches can be sewn at the puppet 's shoulders and armpits for extra strength. Turn the preprinted side out.

The head should be stuffed with recycled stockings, some cotton, rags, or plastic bread bags. Be careful not to stuff the head so tightly that a finger won 't fit in.

The other characters can be made from material scraps about 9″ x 30″. Use Recycler as a pattern. The other characters can have faces drawn on, or features can be cut from paper or material scraps and glued in place. Hair can be made from many recycled materials such as yarn, rope, feathers, cotton or steel wool.

14

Props:
Any object can be used as a prop—to make it easier for the puppeteers to handle, items can be mounted (glued or taped) to dowl rods or unbent coat hangers. This method would be effective for the "garbage" characters in the play.

Working the Puppet
Place your second and third fingers in the puppets head, your thumb in one of the puppets arms, and your fourth and fifth fingers in the puppets other arm. In this position your hand is relaxed and the puppets arm can spread the entire breadth of its body.
Explore finger movements, hand, wrist and elbow movements seperately, and then combined.

IMPROVISATIONS

Good improvisations rely on the ability of the puppeteers to portray the appropriate emotions for his/her puppet in a given situation.

Start by asking students to portray Litterbagger at each of these different ages; ie. 5 years, 10 years and teen-agers. Then ask students to show Litterbagger angry, sad, excited, happy and disappointed at each of these ages. Have them repeat the same exercise with the Recycler character at teen, adult and old age. Have them pay particular attention to voice and movement.

Ask students to describe the characters they are portraying; ie. where do they live, what do they like to do (are these passive activities or hands on activities, that is, do they see the character as a bookworm or a jock). Have them go back to the previous exercise and make adjustments in their portrayal based on this new information.

Ask students how Litterbagger and Oscar the Grouch are different or the same. What kind of superhero is Recycler? Is he a superhero at all? If he isn't, how does he just suddenly appear?

Once students have a good idea of what their character is like, they will have an easy time improvising a play based on the following action outline.

It is important that the activity follow the reading and discussion of the comic book since the play represents the further adventures of Litterbagger and Recycler.

THE FURTHER ADVENTURES OF LITTERBAGGER AND RECYCLER

Time—Later in the same day as the comic book adventure.

Setting—Litterbagger 's house. The house is full of all sorts of trash Litterbagger has collected.

Scene I—Litterbagger and friends are excitedly discussing the days activities. They are very impressed with Recycler, the things he has taught them and the fun they have had with the puppet show.

Scene 2—The kids leave because it is bedtime. Litterbagger, in a very sleepy voice, starts talking to the accumulated trash, telling them how he is going to reuse them in all these nice ways.

Scene 3—As Litterbagger is talking he falls asleep and begins to dream. In his dream the litter comes alive. Individual pieces ask how they will be reused (ie: a tin can will be changed to a candleholder) as he tells them, they become excited. Until they begin to vie for his attention. Me first, no me, no me, how about me? They begin pushing and shoving until it all becomes t o much for him. He screams for help.

Scene 4—Recycler appears and shakes him awake. Recycler asks him what is the matter. Litterbagger begins to describe his nightmare. Recycler tells Litterbagger that litter doesn 't have to be a nightmare. Litterbagger can dream of what a recycled Alaska would be like.

Scene 5—A recycled Alaska would be like____(students put in their own ideas).

CULMINATING ACTIVITIES

The activities suggested in the Activities Handbook lead naturally to a Recycling Fair. Such a fair could serve to focus community attention on possible reuse and recycling activities.

A Recycling Fair could feature student posters, writings and plays. It could include demonstrations of activities such as papermaking and newspaper log rolling. Science experiments such as the Mold Garden or Mini-Dump/Mini Landfill could be exhibited. So could a variety of craft projects reusing "trash." Almost every activity in the Activity Handbook could become part of a Recycling Fair. And, students participation in such a fair would help to reinforce the value of waste and litter reduction.

ANSWER KEYS FOR STUDENT WORKSHEETS

DOES RECYCLING ALUMINUM SAVE ENERGY?

Mr. Fisher 's sixth grade class collected 4 tons of aluminum cans during the school year. If there are 23 cans to one pound of aluminum, how many cans were collected during the year?

$$23 \ \frac{\text{cans}}{\text{lb.}} \times 2000 \ \frac{\text{lbs}}{\text{ton}} \times 4(\text{tons}) = 184{,}000 \text{ cans}$$

Of that 4 tons of aluminum cans, how many pounds of pull tabs could have been collected if it takes 789 pull tabs to equal one pound?

$$184{,}000 \text{ tabs} \div 789 \ \frac{\text{tabs}}{\text{lb.}} = 233.2 \text{ lbs.}$$

If it takes 300 kilowatt hours to recycle a ton of aluminum cans and it takes 16,000 kilowatt hours to make a ton of new aluminum, how many kilowatt hours were saved by recycling the cans from Mr. Fisher 's class?

$$16{,}000 \text{ KWH} \times 4 - 300 \text{ KWH} \times 4 = 62{,}800 \text{ KWH}$$

If 10 one hundred watt lightbulbs use one kilowatt of electricity per hour, how many 100 watt bulbs could be burned for one hour with the energy saved in the problem above?

$$62{,}800 \text{ KWH} \times 10 \ \frac{\text{bulbs}}{\text{KWH}} = 628{,}000 \text{ lightbulbs}$$

DOES IT PAY TO RECYCLE PAPER IN ALASKA?

1. John and Joan are collecting old newspapers to sell to a recycling company. They found that a tightly twined bundle of newspaper 1 foot high, weights 30 lbs. How many one foot bundles does it take to make a ton (2,000 lbs.)?
(66 2/3 or 67 bundles)

2. John and Joan can sell their newspaper for $25 a ton. How much do they receive for each pound of newspaper that they collect?
($.0125 or 1.25¢ per lb.)

3. How much do they recieve for each one foot bundle of newspaper?
(37.5¢ per bundle)

4. After John and Joan collected 12 tons of newspapers they found that it costs $105.00 a ton to ship it to Seattle. Joan discovered that the newspaper could be rolled into logs and sold locally. If a log weighs 3.5 lbs. and can be sold at 10¢, how much more money can they make per log than by selling to a recycler?
(3.5 lbs. paper recycles for 4.375¢ so they can make 5.625¢ per log)

3½ lbs.	Paper	Al.	Iron
	$25/ton	30¢/lb.	6¢/lb.

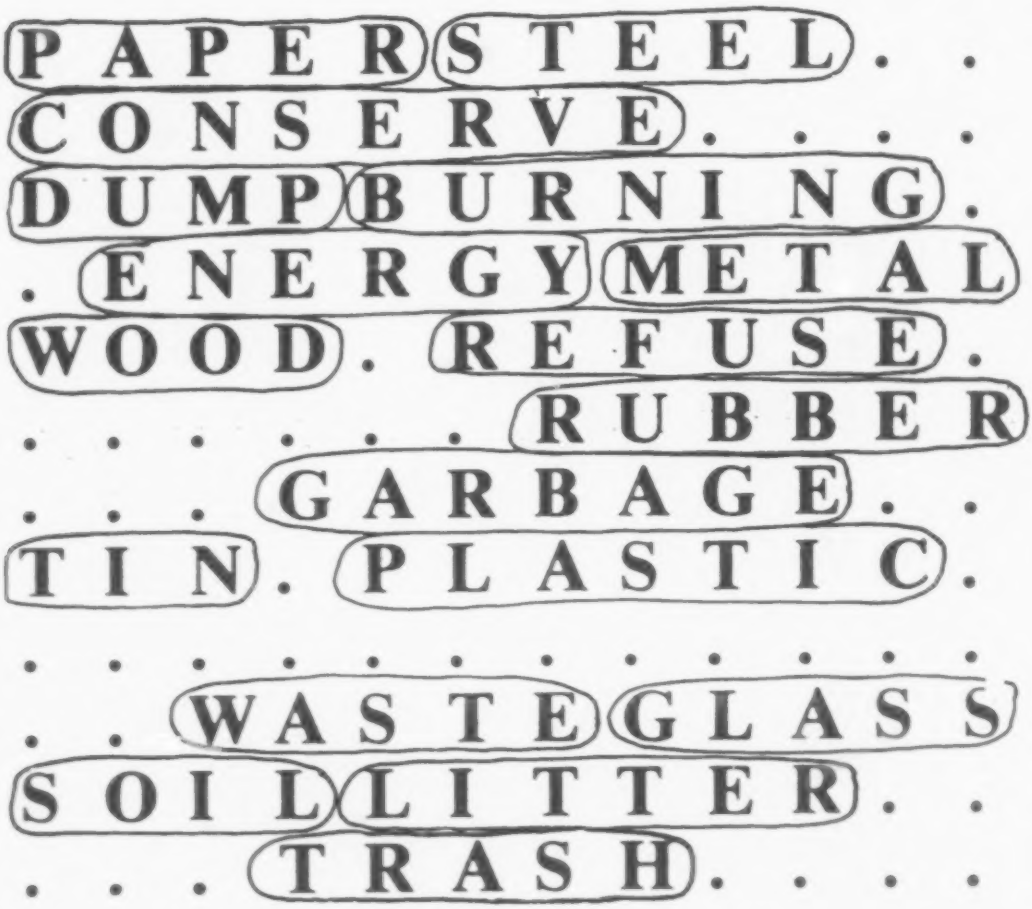
5. How many logs can be made from their 12 tons of newspaper?
24,000 lbs ÷ 3.5
6,857 logs

6. How much money can they make from the logs from the above problem?
$685.70

7. How much could they have made with their 12 tons of newspaper if they could have shipped it to Seattle at no cost?
12 x $25.00 = $300.00

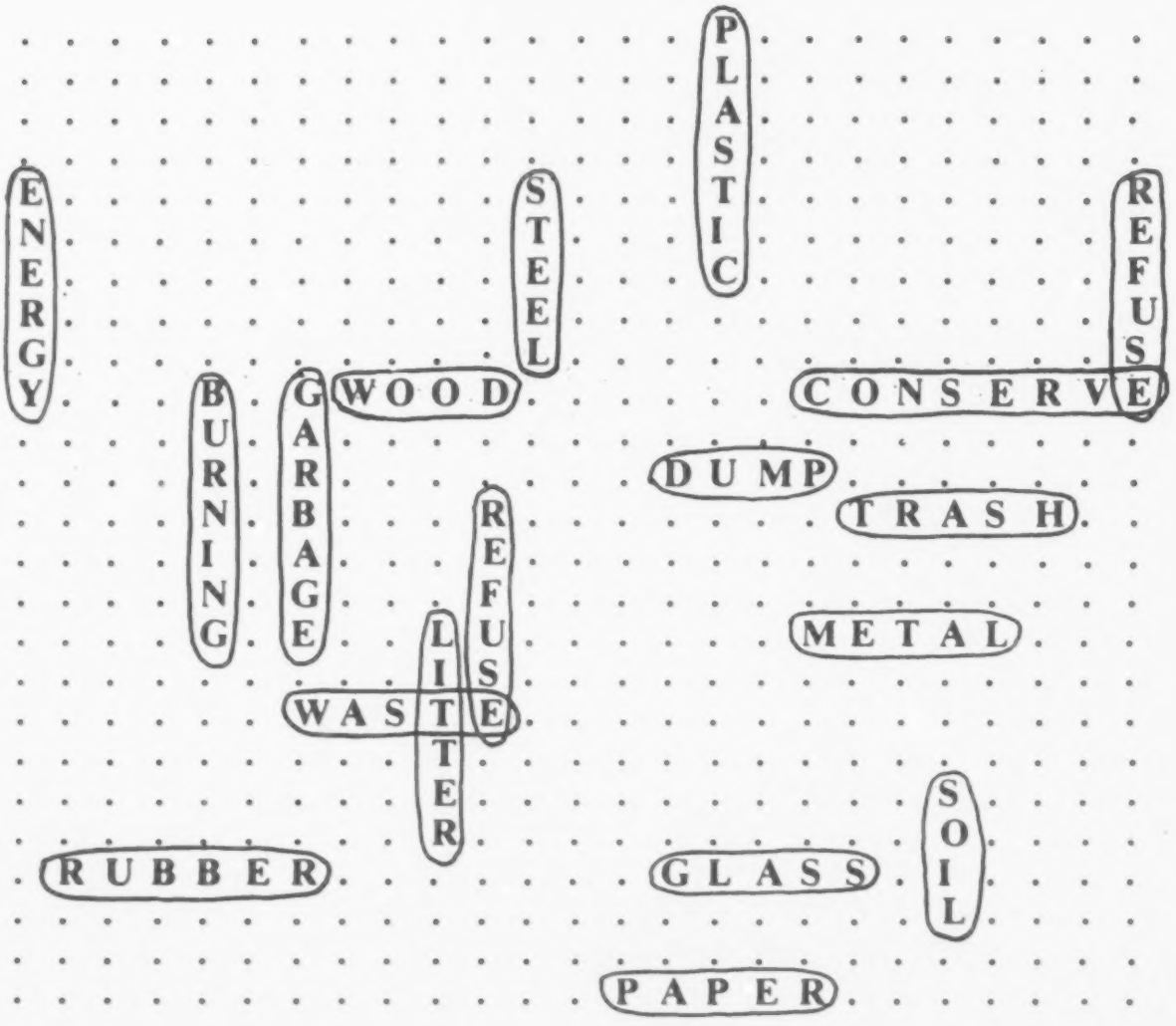
LITTERBAGGER WORDS

WORD FIND 1
EASY



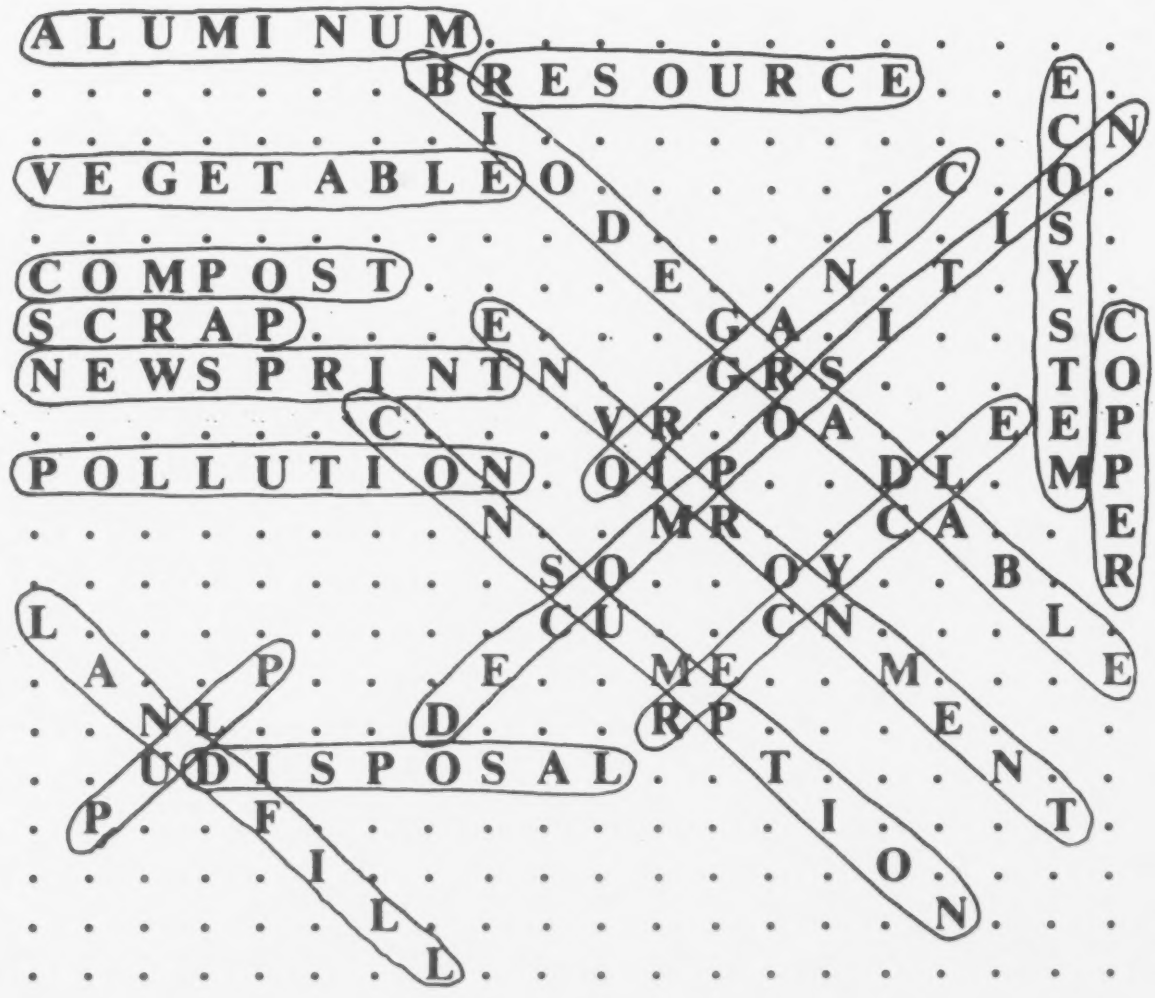
RECYCLER WORDS

WORD FIND 2
HARD



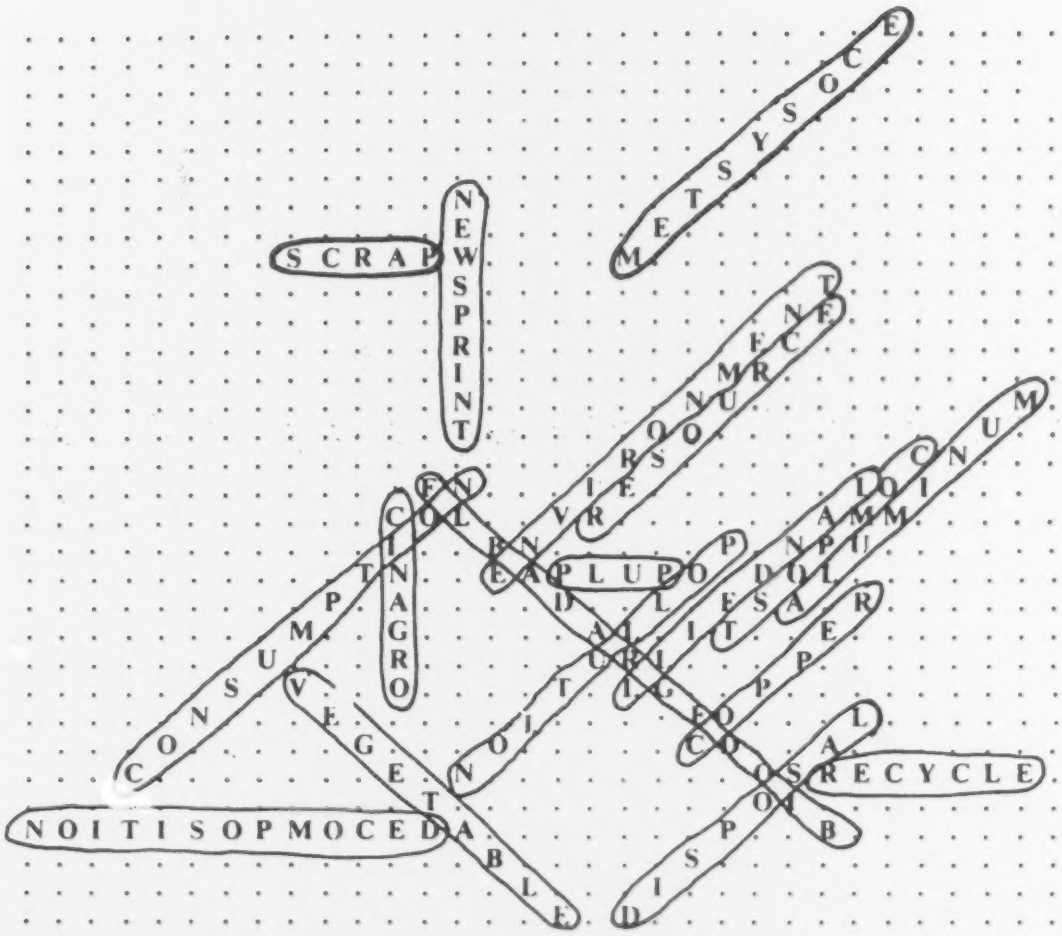
RECYCLE QUEST

WORD FIND 3
HARDER



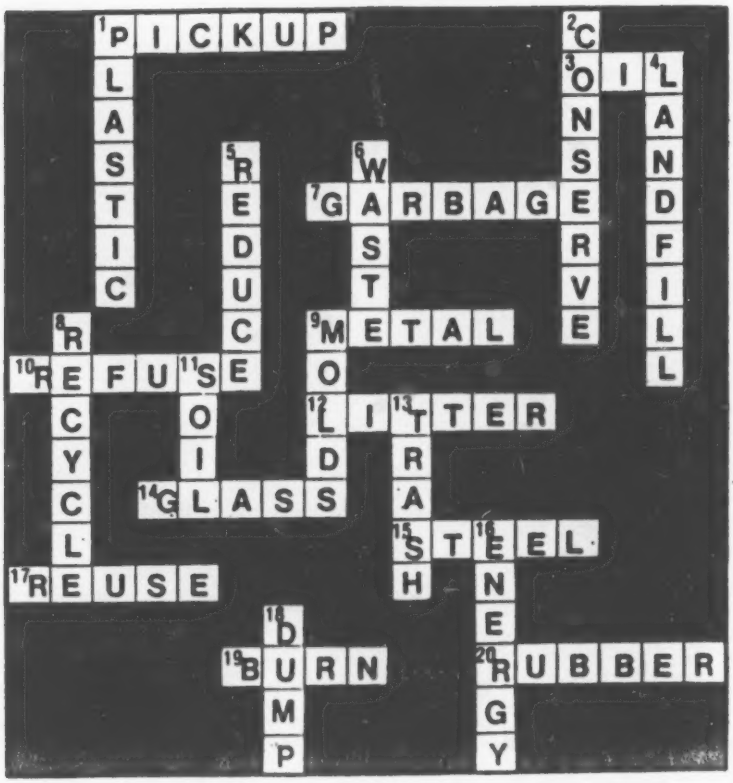
RECYCLE GENIUS

WORD FIND 4
HARDEST



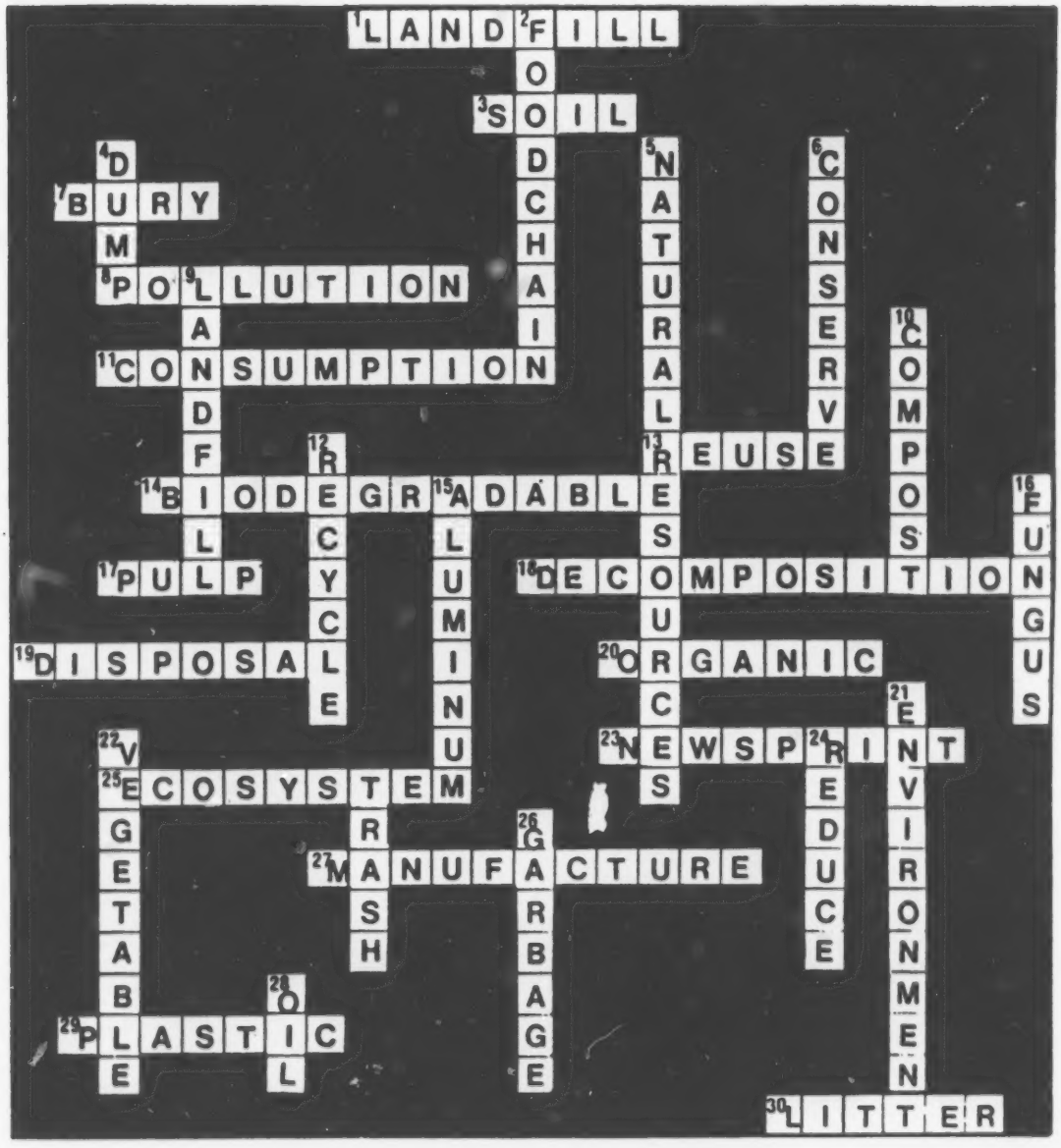
RECYCLING FAN

CROSSWORD
1
EASY



RECYCLING EXPERT

CROSSWORD 2 HARD

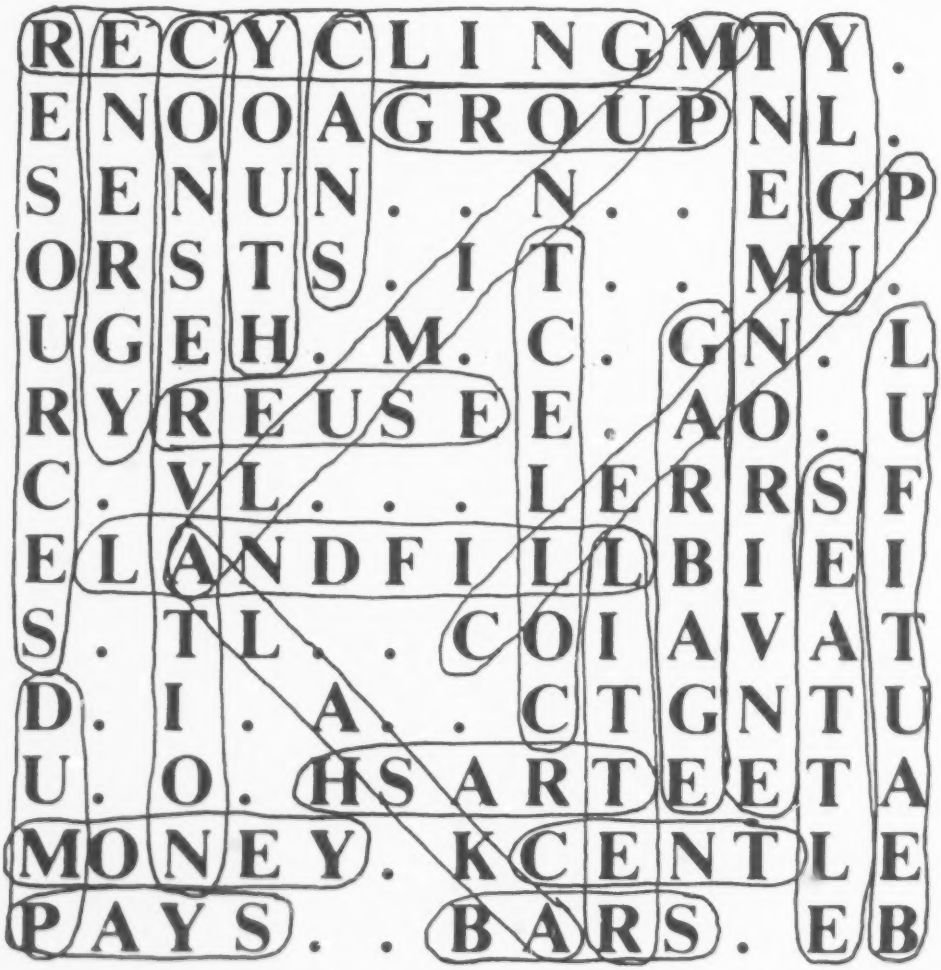


MATERIALS TRACE—
THE WOODEN TOY

1. Logger cuts tree
2. Log truck takes it to mill where
3. It is processed into lumber
4. A toy factory buys the lumber
5. A truck hauls it to the factory
6. Where they make a toy out of part of the lumber
7. Another truck hauls the toy to a wholesale store
8. Where it is sold to a retail store
9. And hauled there in a truck
10. Where it is purchased and transported to a child's home
11. Where, after a while, it is sold at a garage sale
12. And transported to another child
13. Who gives it to his friend
14. Whose little brother uses it some more
15. The toy is discarded at a landfill
16. Where it decays into soil
17. That trees grow out of

RECYCLING HOTSHOT

WORD FIND 5



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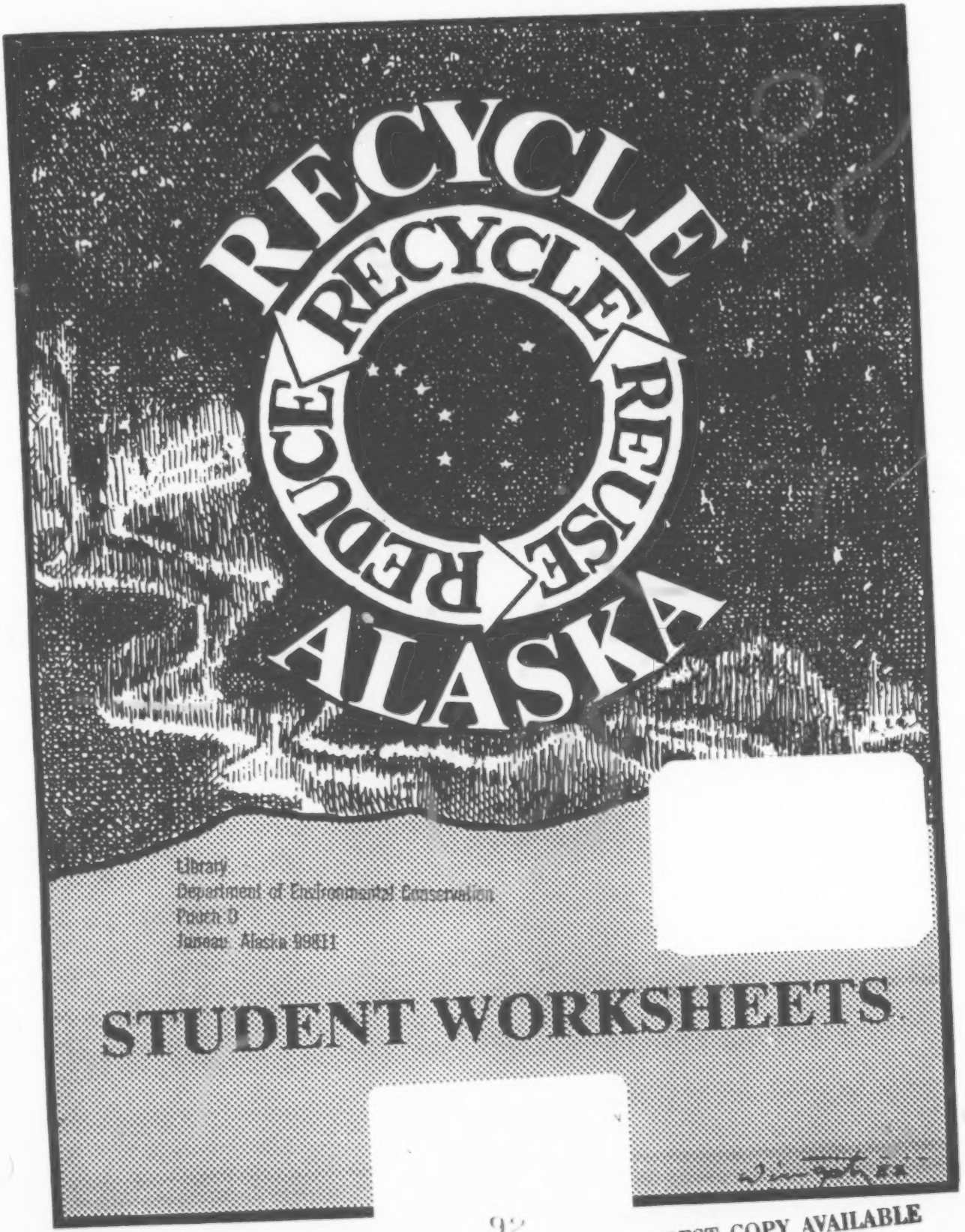


Library
Department of Environmental Conservation
Pouch O
Juneau, Alaska 99811

STUDENT WORKSHEETS

BEST COPY AVAILABLE

FOREST FIELD TRIP
INVESTIGATION HANDOUT

1. a. Find an old log or stump. Smell it. Feel it. Look at it. Describe how it looks, smells and feels.

   b. Guess how much of this log or stump is decomposed: (not at all, ¼, ½, ¾, completely decomposed).

   c. What parts of the log or stump go back to the soil?

   d. Place a small sample of decomposed wood in your bag. Put the rest back in place.

2. a. Look at the log or stump for animals living in it.

   b. If there are any, watch them. Describe what they do when you watch them.

   c. Look around for evidence of animal homes, tracks and paths in the stump or log. Describe these, if present.

3. a. Dig in the old leaves, needles, or moss of the forest floor. Smell them. Feel them. Try to determine how much they are decomposed. Describe what they look like.

   b. Find a leaf "skeleton" if there are any broadleaf trees near your area. See how the veins remain longer than the rest of the leaf. Take the best leaf skeleton back to the classroom to show others.

   c. What are the factors in the environment that cause these leaves to decompose?

4. a. Collect some of each kind of plant to observe what they are like. Keep only one of each kind. Describe color, size, shape, etc.

   b. Collect examples of the different types of plants that decompose vegetable matter. List these plants.

c. Measure the depth of the soil under the plants.
Soil Depth_____

d. If, when you are checking the soil, you find a worm, look closely to see how it is made and how it moves. Write two sentences about what a worm is like.

e. Carefully place the thermometer in the soil after you dig a hole about four inches deep. Put loose soil over it. Wait a few minutes and then read the thermometer. Also read the air temperature.
Soil Temperature_____
Air Temperature_____

UPON YOUR RETURN TO THE CLASSROOM,
AS A GROUP DO THE FOLLOWING:

Determine the number of different kinds of plants and animals found by each group, and add up the total.

Total Kinds Found By The Class Of: _____

Plants_____
Animals_____

TUNDRA FIELD TRIP
HANDOUT SHEET

1. a. Examine a small area (about 1 square foot) of the assigned area. Smell it. Feel it. Look at it. Describe how it looks, smells, and feels.

   b. Are there any examples of dead and decomposing plants? Guess how much this material is decomposed: (not at all, ¼, ½, ¾, completely decomposed)

   c. What parts of the plants go back to the soil?

   d. Place small samples of decomposed plants in your bag.

2. a. Look at the entire marked area for animals living in it.

   b. If there are any, watch them. Describe what they do when you watch them.

   c. Look around for evidence of animal homes, tracks and paths in the vegetation. Describe these.

3. a. Return to the one square foot space that was examined earlier and carefully remove the surface vegetation so that it can be replace later. Examine the material in the cleared area. Smell it, feel it. Try to determine how much of this is soil and how much is decomposed plant material. Describe what the cleared area looks like.

   b. Find some pieces of dead plant material and examine them. What portions decompose and which remain the longest? Take some of the remaining parts back to the classroom to show others.

   c. What are the factors in the environment that cause these plants to decompose?

4. a. Collect some of each kind of living plant to observe what they are like. Keep only one of each kind. Describe the color, size, shape, etc.

b. Collect examples of the different types of plants that decompose vegetable matter. List these plants.

c. If possible, locate a large rock. Is anything growing on it? If so, carefully lift some of the living material and examine what is happening underneath. What is the plant doing to the rock? How does this process improve growth conditions in the area?

d. Return to the one square foot area that was cleared earlier. Measure the depth of the soil in the area.
Soil Depth_____

e. Carefully place the thermometer in the soil after you dig a hole about 4 inches deep. Put loose soil over it. Wait a few minutes and then read the thermometer. Also read the air temperature.
Soil Temperature_____
Air Temperature_____

UPON YOUR RETURN TO THE CLASSROOM,
AS A GROUP DO THE FOLLOWING:

A. Determine the number of different kinds of plants and animals found by each group and add up the total.

Total Kinds Found By The Class Of:_____
Plants_____
Animals_ _____

B. Use resource center study aids to find out about the life and ways of the various plants and animals.

C. Make drawings of the various plants and animals you have found.

D. Discuss the need for people to learn how to recycle their many waste products. At a future date you may wish to have a unit study on how human handle their "solid wastes." Are there decomposers for humans' solid waste?

E. Write a fiction story, poem, news report, or scientific report about the role of decomposers and how they clean up the environment.

Use the materials and information collected in this activity to conduct the "Tundra Community" exercise. 4

THE STORY OF THE_____

I am a(n)_____ container. Please tell my story by finding answers to the following questions:

1. What do I look like?
2. Why do I have a label?
3. What are some of the things I am used for?
4. What am I made of?
5. Where do my manufacturers get the raw materials to make me?
6. Are large amounts of my raw materials available?
7. How many years will my raw materials probably last?
8. Is there any pollution of the land, the air, or the water, when companies extract my raw materials from the earth? If so, how?
9. How do manufacturers change the raw materials to make me?
10. Does the changing of my raw materials cause pollution of the land, the air, or the water? If so, how?
11. Am I thrown away after I am used?
12. What chemicals are released when I am burned? Are they harmful if released into the environment? Can they be filtered and disposed of properly?
13. Do I break down into earth again if I am buried? If so, how?
14. Do I disintegrate if I am thrown into a river, lake, or ocean? If so, how?
15. What are some ways in which I could be re-used?
16. Can I be recycled? Am I recycled? Where am I recycled?
17. What happens to me when I am recycled?
18. Can I be safely burned to produce energy from the heat?
19. Who pays the real cost for manufacturing and disposing of me?
    - *The manufacturer who makes me?
    - *The company which uses me?
    - *The consumer who buys me?
20. Who is responsible for disposing of me? Who pays the cost of disposal?
21. Do you think I am a good container? Why or why not?

DOES RECYCLING ALUMINUM SAVE ENERGY?

Mr. Fisher 's sixth grade class collected 4 tons of aluminum cans during the school year. If there are 23 cans to one pound of aluminum, how many cans were collected during the year?

Of that 4 tons of aluminum cans, how many pounds of pull tabs could have been collected if it takes 789 pull tabs to equal one pound?

If it takes 300 kilowatt hours to recycle a ton of aluminum cans and it takes 16,000 kilowatt hours to make a ton of new aluminum, how many kilowatt hours were saved by recycling the cans from Mr. Fisher 's class?

If 10 one hundred watt lightbulbs use one kilowatt of electricity per hour, how many 100 watt bulbs could be burned for one hour with the energy saved in the problem above?

DOES IT PAY TO RECYCLE PAPER IN ALASKA?

1. John and Joan are collecting old newspapers to sell to a recycling company. They found that a tightly twined bundle of newspaper 1 foot high, weighs 30 lbs. How many one foot bundles does it take to make a ton (2000 lbs.)?

2. John and Joan can sell their newspaper for $25 a ton. How much do they recieve for each pound of newspaper that they collect?

3. How much do they recieve for each one foot bundle of newspaper?

4. After John and Joan collected 12 tons of newspapers they found that it cost $105.00 a ton to ship it to Seattle. Joan discovered that the newspaper could be rolled into logs and sold locally. If a log weighs 3.5 lbs. and can be sold for 10¢, how much more money can they make per log than by selling to a recycler?

5. How many logs can be made from their 12 tons of newspaper?

6. How much money can they make from the logs from the above problem?

7. How much could they have made with their 12 tons of newspaper if they could have shipped it to Seattle at no cost?

LITTERBAGGER WORDS

P A P E R S T E E L Q N
C O N S E R V E C F E F
D U M P B U R N I N G R
N E N E R G Y M E T A L
W O O D P R E F U S E T
L F T J K J R U B B E R
G D Q G A R B A G E Y M
T I N M P L A S T I C T
R E U E Q J V C N U M X
R X W A S T E G L A S S
S O I L L I T T E R Q X
I O X T R A S H F U F L

There are 18 words here—can you find them?

Here are the words to look for:

BURNING
CONSERVE
DUMP
ENERGY
GARBAGE
GLASS
LITTER
METAL
PAPER
PLASTIC
REFUSE
RUBBER
SOIL
STEEL
TIN
TRASH
WASTE
WOOD

RECYCLER WORDS

W O O D K S N P W J U I B G M P F V V D X C Y U Y
K O G K G D U M G X E M M J S L H U T B E F O E A
J S L X K Q U T O P Y F T L J A H T M C F U Y H R
I C N B E I F H A P A C S T Z S X R P I P U L F P
E P Q Z Z S A K T K G S I G F T I T H W I H T A R
N I M S Y P Q C E R K T B S R I T U U O L D R C E
E I H E Z I I A Y V M E D U Q C V C T D F Q Z R F
R I K Q Q B M D Y I U E S O Z T W W S J Y Q Z H U
G M Q B O Y V B A W C L C Y T N K T I T E J T Y S
Y V U F B Y G W O O D Y Z D Z I H C O N S E R V E
Y I M M U W A U P F F S C O O J A K V A R Q R P I
E F N U R S R J L O S N X T D U M P Q B H E B V B
F M G B N F B J X V R I K X U S Q J T R A S H W E
V M G P I A A A U A E B X Q G W C A A G V H S V W
P G K X N B G K M S F D D F D W D M E T A L Z X X
S B L J G C E R J L U N O E A L P D D N X X V X I
J D D T W E L E T I S F M E D J X H U T L F O W O
F B F V E K W A S T E M K D T P G J B L C W C J I
K K I L E B H S W T G W P N X G K U M J E G I G N
V F N Z E W K E B E T X X C L M D E H B S H A N W
N E F P X R W R L R W G P M I W T W S O O G H Z K
P R U B B E R O R X Y X T R G L A S S J I H G Y K
X P O T R E M P H J V M K H B Q B T L K L U A Y T
Y P A Z N W T C H G D M E N H J C J O W Z G Z O I
F T I A L F C V H N T C I P A P E R N N B S H Z N

There are 18 words here—can you find them?

Here are the words to look for:

BURNING
DUMP
GARBAGE
LITTER
PAPER
REFUSE
SOIL
TIN
WASTE
CONSERVE
ENERGY
GLASS
METAL
PLASTIC
RUBBER
STEEL
TRASH
WOOD

RECYCLE QUEST

A L U MI N U MP S H MU V B G S R A R
S N A E F X L B R E S O U R C E I T E Q
B S L MZ X S K I X T C G Q V A S I C N
V E G E T A B L E O Y Y D Q S A C N O W
O D H A U K K MG Q D Y S C O I L I S L
C O MP O S T N MQ D E Z N N Z Y D Y C
S C R A T MP Z E B ML G A V I L X S C
N E WS P R I N T N D O G R S L H S T O
R Y I Z B Q C A T Y V R V O A MT E E P
P O L L U T I O N R O I P O A D L E MP
N D T Q L Y S D N B WM R T X C A WU E
G E I WM Q L B J S O J Y O Y MM B G R
L F J A V P B WU C U Z A C N S I A L W
E A B U P N Y ME F V ME J S MO N V E
L S N L T P WD Y I O R P L H L E N I X
U N U D I S P O S A L H H T Z J N N S M
A P P MF MG P K K T Y R H I P C V T T
F V J MO I S U J WT J MS MO K F L B
P E L O WV L S I J WX T U D MN P H O
J V Z E X U Q L N H MA Q D X U E E X E

There are 18 words here—Can you find them?

Here are the words to look for:

ALUMINUM	POLLUTION	ECOSYSTEM
COMPOST	RECYCLE	LANDFILL
COPPER	SCRAP	ORGANIC
DISPOSAL	BIODEGRADABLE	PULP
ENVIRONMENT	CONSUMPTION	RESOURCE
NEWSPRINT	DECOMPOSITION	VEGETABLE

RECYCLE GENIUS

L S U N K C X J R O E U O N O N T U G V J H Z L U I E G E Z Y S
S U G L U C L Q P H C K M T C B H V Q O D J U J O C T F E C T Q
J I X X D O Z P E O I Y P V I G X Z I K I Q L H O W Y J K M U S
G W R E T I T W A R U A E I I C C B A B K U J S K W H C V N U S
C C O A U Y Y Q W P H L O K G S K I O Y C O Y K B I L J X V Y H
K C Z Q N F V M I D E Y G F K R E W A B V S W K W I Q P V V D G
A Q D G E H J H E R Q L A N G A Q S V O T A M R O A X U B B G B
D X L J P S O M G S C O R E Z C P O P E P T H X H D Q E B H S
V I C V R M I E S C R A P W U K A T M F G R E U P I S R J C C R
D E V A R W T W B G V V G S A W G J Q Y S N U J T O Z Q K Q G O
Y T T Y J A E X W K M Q R P N A D B R R V B K N E F J V H X F V
E C E C R P B L Y A X T X R Z L V A Z U G S E C H H X S G Z G E
G I K Y W X U H L F O Y P I C X P F C O Y M R K Y R T Q M R B O
X L V A L N H Y M O F D L N Y X J G J L N U X M L A P W W G M B
H K G Y D L K B S U R M S T I L G P I O O Y H O U O F O W U V I
D K Y S D Z Z H F W N J F M I X P D R S U S T A R C O C N T I K
X A Y T Y Y F R P J I T E N Y Q Z I E O I T L G N L O I X R A J
O D I P X V T J L J O C O L W N V R L W H B V G A M M X T K D P
F C A H Y V V U Y J H I K H B N H W S A D P C N P U T X I N B F
H X D H X H V K C O T N E B E A P L U P O W D O L L C Z J I S H
O I O R U S B W P P M A J J F O D E Z L I F S A P R N M V E U D
C I K Q Y F O U M L O G R C B X J A L D I T M Z E Y Z M I X U E
E E H H I S M U Z T W R V J U H B U R L M N T P C L P W P Z E J
M W J J H W S Q V S O O S C F G T W L G Y S P M O D K G R G U Y
W O J X F N V F E E W A V M B I N K M E E O F M L L X M S K I W
P P K K O O A I O R G F H H O K Y S P I C D K B A T Y K N X G P
Z Q V C T O U T O E R E D N H A K E O M R A O S R E C Y C L E M
M R J J K C S L A N N E T P N A Z F L G O A O I R U B E H I J Q
N O I T I S O P M O C E D A I N V W I E F P V U B J P Y M I M P
J F B B K H R T D O I G M Y B O K N O S S N D S Y A P E M B R Q
E W L P Z O O K R N W Z E P V I B Y N I J I E P X W D V Q A O P
I R Y V I C Y B G H L W K I V B E H D D Y D K Z I I X C L A X G

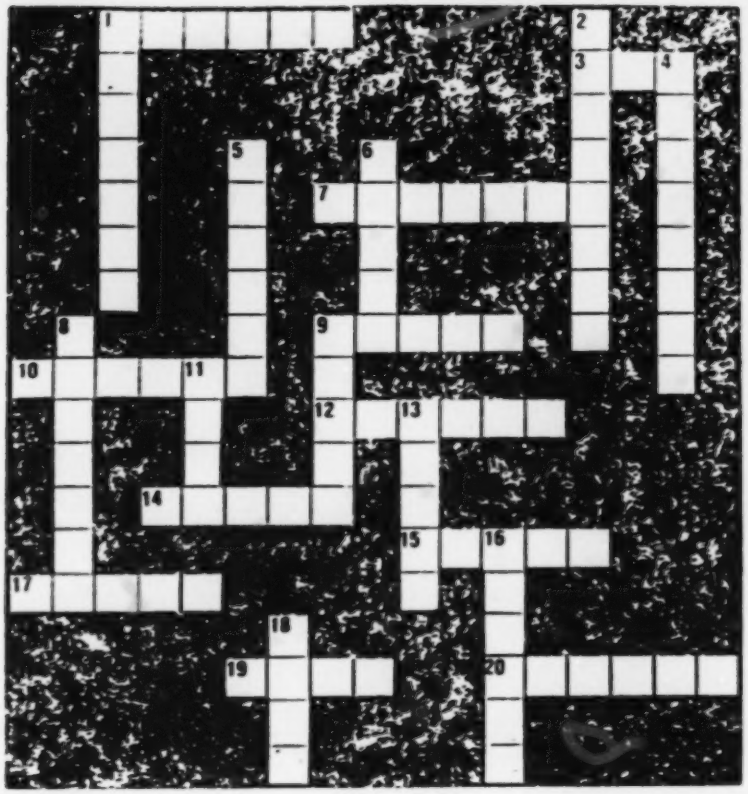
There are 18 words here—can you find them?

BEST COPY AVAILABLE

Here are the words to look for:

ALUMINUM	CONSUMPTION
COMPOST	DECOMPOSITION
COPPER	ECOSYSTEM
DISPOSAL	LANDFILL
ENVIRONMENT	ORGANIC
NEWSPRINT	PULP
POLLUTION	RESOURCE
RECYCLE	VEGETABLE
BIODEGRADABLE	SCRAP

RECYCLING FAN



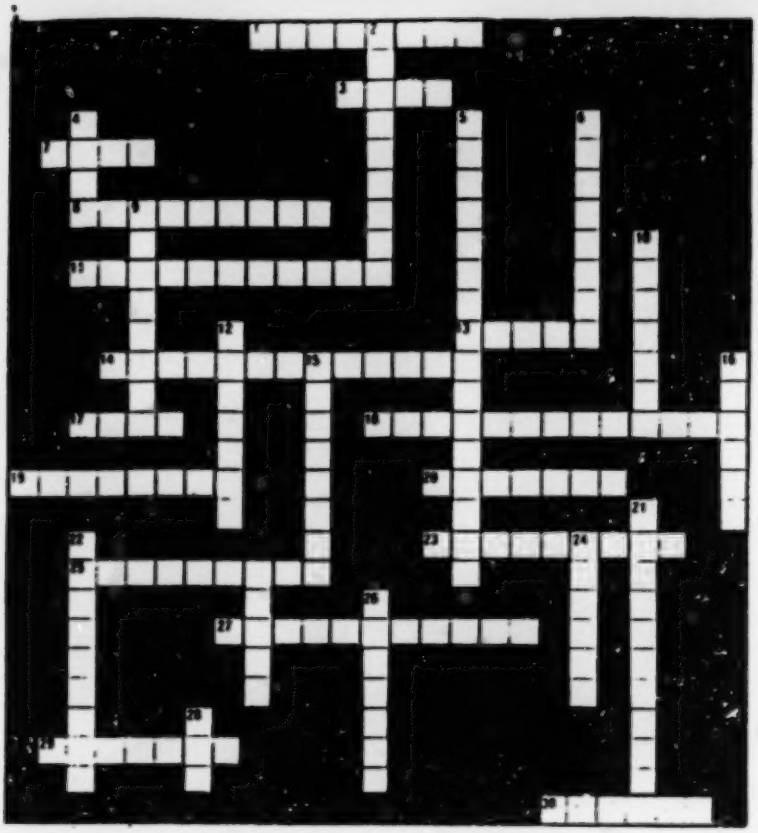
ACROSS

1. One way to remove litter (2 words)
3. Petroleum
7. Things thrown away, especially food scraps
9. Material like steel or tin
10. Another word for trash
12. Trash left around
14. Material made from melted sand
15. Most "tin cans" are made of this
17. Reduce,_____Recycle
19. One way to get rid of garbage
20. Tree sap is made into_____tires

DOWN

1. Man-made material that is not biodegradable
2. To use no more than we need
4. A place to drop off garbage
5. _____Reuse, Recycle
6. To use more than we need
8. Reduce, Reuse,_____
9. Grows garbage
11. Earth in which things can grow
13. Something thrown away
16. Power
18. A place where trash is left, a garbage_____

RECYCLING EXPERT



ACROSS

1. A place where solid waste is safely dumped
3. You plant in it
7. What you do with garbage in a landfill
8. Ruining our environment
11. Using up
13. Reduce, _____. Recycle
14. Will rot and become part of the soil
17. Paper is made from wood _____
18. Rotting
19. Getting rid of something as in garbage _____
20. Something living or formerly alive
23. The kind of paper used for newspaper
25. Animals and plants living together
27. To make a product from raw materials
29. Man-made material that is not biodegradable
30. Trash where it doesn't belong

DOWN

2. Interrelated feeding system (2 words)
4. A place to drop off garbage
5. Raw materials (2 words)
6. To use no more than we need
9. Same as 1 across
10. Decaying mixture for fertilizer
12. To remanufacture materials
15. Metal used in beverage cans
16. One type of the green part of the food chain on the tundra
21. Our surroundings
22. Food from plants
24. We create less garbage if we _____ the amount of things we use
26. Trash
28. Petroleum

RECYCLING HOTSHOT

R E C Y C L I N G M T Y O
E N O O A G R O U P N L S
S E N U N T S N O R E G P
O R S T S WI T MO M U J
U G E H S M O C P G N Y L
R Y R E U S E E Z A O F U
C F V L L U G L E R R S F
E L A N D F I L L B I E I
S R T L L C C O I A V A T
D O I P A A P C T G N T U
U Q O M H S A R T E E T A
M O N E Y K K C E N T L E
P A Y S P Z B A R S C E B

There are 25 words here—Can you find them?

Here are the words to look for:

RECYCLING	LITTER	DUMP	REUSE
CONSERVATION	CLEANUP	UGLY	PAYS
ALUMINUM	CANS	BARS	CENT
LANDFILL	GARBAGE	RESOURCES	ENERGY
ALASKA	COLLECT	BEAUTIFUL	GROUP
MONEY	ENVIRONMENT	SEATTLE	TRASH
			YOUTH

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